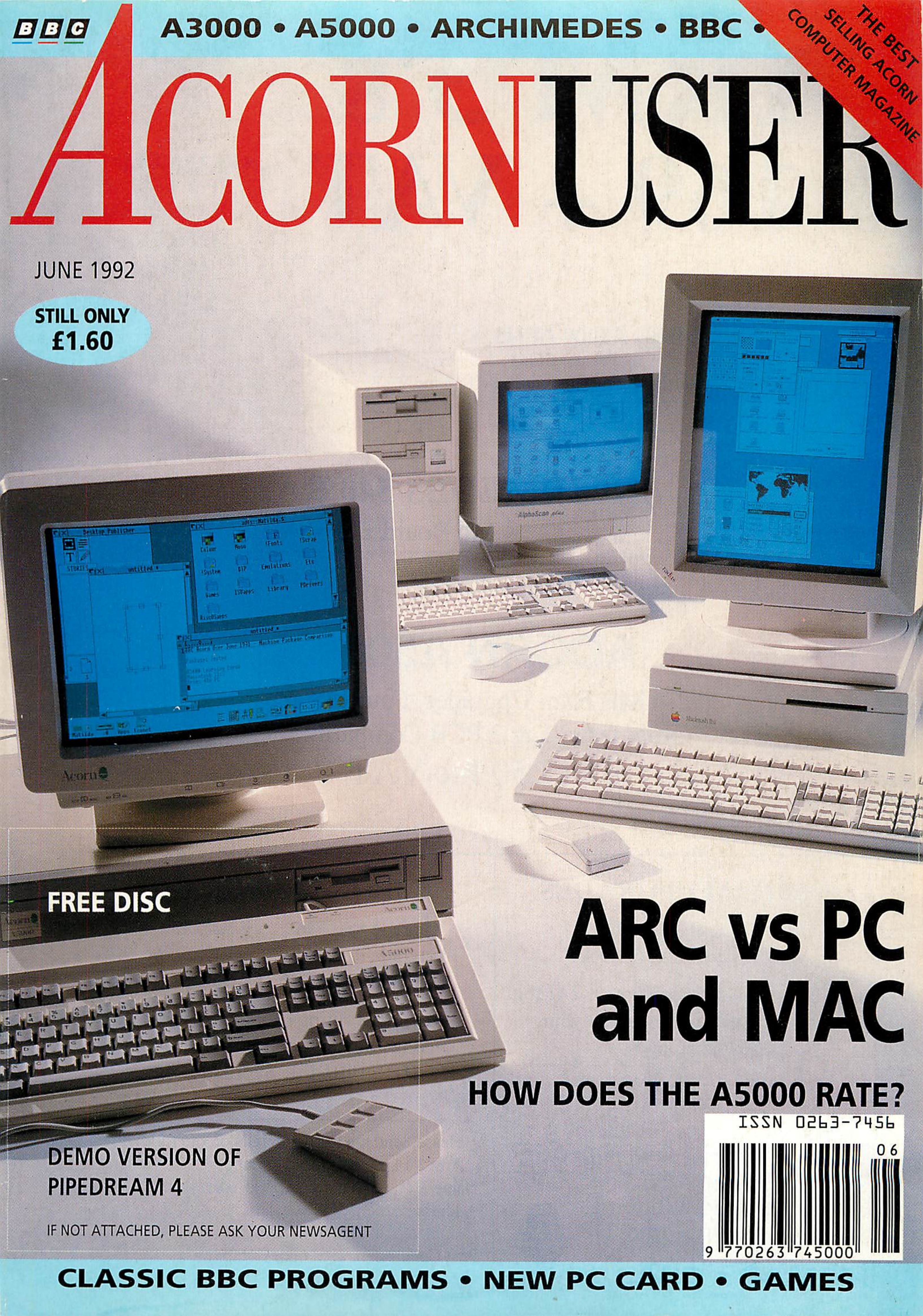

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√ QuicKey
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......
Go back to main TaskList

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OK

"Simply fontastic!"

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Impression

F3	F4	F5	F6	F7	F
Documen	Find and Rep	New Style	Edit Style	New Chapter	Dicti
30%	40%	50%	60%	70%	8
Italic	Bold	Left Align	Centre	Right Align	Fully

Main Heading | Sub-heading

:0 HardDisc4 IDE 4 SCSI 4 Printer

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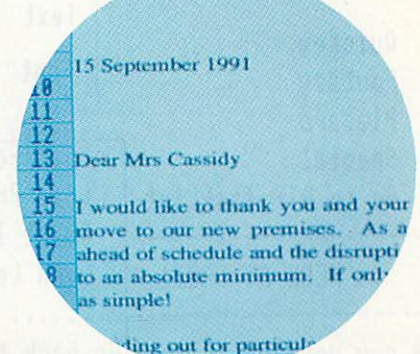
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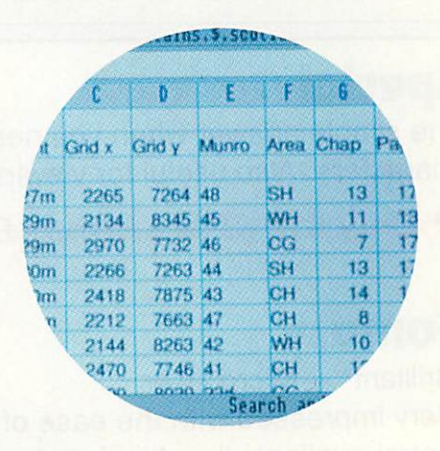
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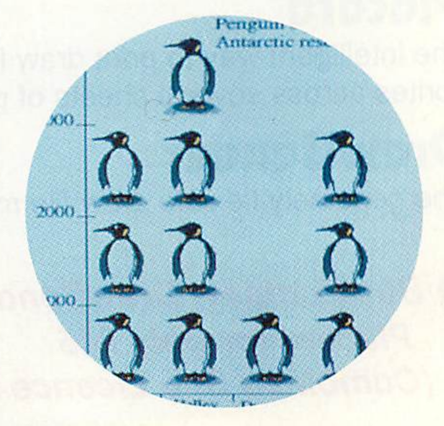
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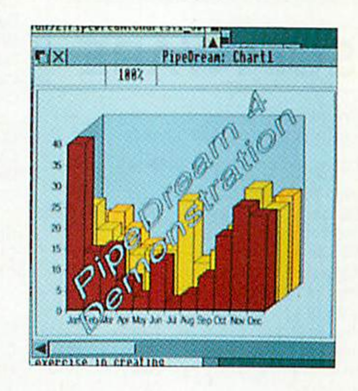

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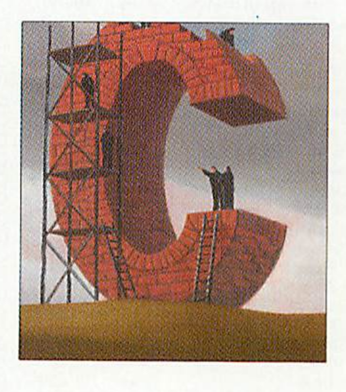
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SkyHunter	Longman	£23
smArt	4mation	£50
smArt Dinosaurs / Faces / Faces (French) / Faces (German) / Fashion / Heraldry / Homes / Homes (French) / Homes (German) / Leisure / Leisure (French) / Leisure (German) / Look Smart / Modern Languages / Smartoons / Trees and Gardens – each	4mation	£15
smArtFiler	4mation	£32
Snippet	4mation	£26
SolidCAD	Silicon	£115
SolidsRender	Silicon	£115
SolidTools	Silicon	£269
Spark	David Pilling	£5
Sparkle	Morley	£59
Special	ICS	£10
– site licence		£30
Speech!	Superior	£14
Spelling week-by-week	Chalksoft	£22•
Splice	Ace	£29•
Sporting Triangles	CDS	£20
Sports Day	Selective	£22
Square Route	Computer Eyes	£16
Stock Management	Minerva	£78
Studio24Plus Version 2, age 11+	EMR	£149•
Studio24Plus Version 3, age 12+	EMR	£210
Super-Dump	Silicon	£20
Superior Golf	Superior	£14
Super-Plot	Silicon	£28
Supersounds	CIS	£15
Supersounds 2	CIS	£12
Swiv	Krisalis	£19•
System Delta Plus II	Minerva	£50
– Reference Guide	Minerva	vo £25
TABS	ExpLAN	£95•
Tactic	Eterna	£15
Talisman	Minerva	£12
Target Maths	Triple R	£15•
TechWriter	Icon	£245
Telling the Time, age 3-12	Rainbow	£7
Thundermonk	Minerva	£12
Timetabler	Minerva	£549
TimeWatch	Mitre	£24
Tiny Logo + Tiny Draw	Topologika	£27
Titler	Clares	£120
Toolkit Plus	Clares	£35
Tools Graphics, drawfiles	Micro Studio	£23
Top Banana	Hex	£19•
Touch Type	Iota	£39
Tower of Babel	Cygnus	£17
Trace	David Pilling	£5
Tracer	Midnight	£46
Tracker	Vertical Twist	£37
Transport, drawfiles	Micro Studio	£25
Trivial Pursuit	Domark	£22
Turbo Type	CIS	£20
Tween	Ace	£29
Twin	Acorn	£24
Twin World	UBI Soft	£14
TWO (Task and Window Organiser)	ICS	£19
– site licence		£60
TypeStudio	RISC	£43•
Utility Disc 1	Data Store	**£8•**
Utility Disc 2	Data Store	£13
Utility Disc 3	Data Store	£7
Utility Collection	Data Store	£21
Vector	4mation	£POA
View»Mac 3	Human	£65
– Arc/Mac Cable	Human	£24
Vox Box	Clares	£47
Waterloo		£23•
Wimp Game	Fourth Dim	£16•
Wonderland	Virgin	£24
Words and Pictures	Chalksoft	£17
World Championship Boxing Manager	Krisalis	£20
World Geography Maps, draw	Micro Studio	£23
World Map Study, age 7-16	ESM	£42
World Wildlife, sprites	Micro Studio	£16
Worra Battle	Oak	£14•
WorraCAD	Oak	£83•
Worra Plot	Oak	£24
X-Fire	Fourth Dim	£21•
Z88: A Dabhand Guide	Dabs	vo £15
Z88 PipeDream Guide	Dabs	vo £15
Zarch	Superior	£14
Zelanites	Micro Power	£14

HARDWARE

A5000 COMPUTERS

Item	Supplier	Price
2Mb Hard Disc Colour System	Acorn	£1499
– as above + Learning Curve		£1530

(Finance & special purchase schemes available)

MEMORY

Fitting extra unless otherwise stated
† Fitting easy ‡ Fitting needs expertise

Item	Supplier	Price
A3000 2 Mb Non-upgradable †	IFEL	£55
A3000 2 Mb Upgradable †	IFEL	£63
A3000 4 Mb †	Atomwide/IFEL	£140•
A310 2 Mb Upgradable soldered ‡	IFEL	£99
– as above + MEMC1a		£149
– as above + MEMC1a + fitting		£200
A310 4 Mb soldered + MEMC1a ‡	IFEL	£225
– as above + fitting		£277
– as above + fitting + OS3 carriers		£298
A5000 2-4 Mb Upgradable †	Atomwide	£109
A5000 2-8 Mb including fitting	Atomwide	£500
A5000 4-8 Mb including fitting	Atomwide	£391
A540 4 Mb †	Atomwide	£268

MISCELLANEOUS

Item	Supplier	Price
386C PC Expansion Card	Aleph One	
– 1 Mb		£463
– 4 Mb		£579
4-slot 4-layer Backplane	IFEL	£59
9060S Monitor	Eizo	£450
9070S Monitor	Eizo	£640
A300/400 Fan kit	ICS	£15
A310 RISC OS Carrier Board ‡	IFEL	£25
A5000 Fitting Kit for second hard disc	ICS	£15
ARM3 ‡	Aleph One	£199•
Clares Micro Mouse	Clares	£26
Dongle Dangle with screw fittings	ICS	£6
Fan filters (pack of 10)	ICS	£4
FaxPack	CC	£289
Monitor Stand for A3000	ICS	£18
Podule Case for A3000		£16•
TouchWindow	Lindis	£234
Whisper Fan Quietener (for A300/A400 series only)	ICS	£15

HIGH DENSITY 3½" FLOPPY DISCS

Item	Supplier	Price
Pack of 10		£13•

ICS

051-625 1006

PRINTERS

Item	Supplier	Price
ArcLaser 300-6	Calligraph	£895
ArcServer 300-8	Calligraph	£985
Bubble Jet BJ-10e	Canon	£205
Bubble Jet BJ10ex + TurboDriver	Canon/CC	£248•
Bubble Jet BJ-300	Canon	£360
Bubble Jet BJ-330	Canon	£405
Bubble Jet BJC800 + TurboDriver	Canon/CC	£1889•
Laser Direct HiRes4 with 50-sheet tray	CC	£885•
– 250-sheet Paper Cassette		£99
Laser Direct HiRes8	CC	£1280
Laser Direct LBP-4 Card	CC	£325•
Laser Direct Qume	CC	£699•
LBP-4	Canon	£659
Refill toner cartridge for Canon EPS		£50
New toner cartridge for Canon LBP-4		£59

SCANNERS, DIGITISERS

Item	Supplier	Price
ArcScanner including Epson GT-4000	Clares	£1660
FaxScan	Spacetech	£94
FX9600AT + Maintenance	Amstrad	£376
Hawk V9	Wild Vision	£199
– A3000 version	Wild Vision	£278
Image (colour)	Irlam	£589
Image Scanner	Iota	£389
– Colour upgrade	Iota	£98
i-Scan 200	Irlam	£539
i-Scan 400	Irlam	£589
Pineapple Colour Video Digitiser	Pineapple	£195
– A3000 boxed	Pineapple	£230
Scan-Light A4	CC	£277
– with Sheet Feeder	CC	£370
Scan-Light Junior	CC	£128
– A3000 internal	CC	£128
Scan-Light Junior 256	CC	£199
– A3000 internal	CC	£199
Scan-Light Professional	CC	£825
– as above + SCSI interface	CC	£910
SnapShot Colour Video Digitiser	Lingenuity	£195
– A3000 version	Lingenuity	£275
Spectra	RISC	£545
– A3000 Internal	RISC	£545
– A3000 External	RISC	£565
Video Digitiser	HCCS	£49

Apologies to those who have waited longer than usual for recent orders. Our move to new premises caused a backlog which was very hard to clear, and we are grateful to all our old and new customers who were patient. To those who couldn't wait – please allow us another opportunity to show you how good our service normally is.

I²C PRODUCTS

Item	Supplier	Price
AnDi Oddule	Baildon	£49
I²C Adaptor (needed unless you already have an I²C socket)	Baildon	£10
I²C SWI (enhanced IIC_Control)	Baildon	£15
– bought with Oddule		£5

KEYBOARD COVERS

Item	Supplier	Price
Seal 'n Type (spill-proof)		
– Archimedes / A5000	Kador	£14
– A3000	Kador	£14

FUNCTION KEY STRIP ORGANISER

Item	Supplier	Price
Arckey	ICS	vo £3
– pack of 4		vo £10

AUTHORISED ACORN DEALER

ICS (Ian Copestake Software)

Dept B31, 1 Kington road, West Kirby, WIRRAL, Merseyside, L48 5ET

Tel: 051-625 1006 Fax: 051-625 1007

E&OE B31 92AP20

LICENSED CREDIT BROKER



COMPUTERS BY THE TROLLEY LOAD

CAN THE trolley-filling philosophy of megastore shopping translate to computer buying? Well, if the Croydon-based PC World store is anything to go by, it can.

PC World, part of the Vision Technology Group, claims to be the largest PC store in the UK, with over 30,000 sq feet of floor space and over £1.5 million-worth of stock. Selling most brands of personal computer, including Acorn A5000 and BBC A3000 machines, there are special demonstration areas for both hardware and software. There is also a special area where software can be loaded and the machine of your choice fully checked before you leave the store.

PC World's managing director Jan Murray agrees that computers have become commodities, and that the demand is there for more out-of-town megastores like PC World. Indeed, the company is planning to open at least one new store in the near future, in north London

Since taking over Simnett Computers in 1990, the company has become one of Acorn's largest dealers, selling several thousand units per year. 'We have a wide variety of customers who are looking for Acorn products, ranging from educationalists to concerned parents who want to buy the same computers as their children use in school.

'Although Acorn is still regarded as an expensive option, we believe there is plenty of potential for the brand.' PC World is on the A23 Purley Way, Croydon, Surrey. It opens seven days a week (9am to 7pm Mon-Fri, 9am to 6pm at weekends). Tel: 081-649 9000.



Managing Director Jan Murray with an A5000

ACORN WEATHERS THE RECESSION

THERE has been a welcome return to profitability by Acorn according to results published for the second half of 1991.

A net profit of £694,000 for the second half of the year to December 1991, more than compensated for a £420,000 loss during the first half of that year.

Operating profit was more than halved from £2.6 million to £1.1 million. After interest payments and £102,000 attributed to a loss in a 'related' company, the final net profit was £274,000 compared with £1.58 million in the previous year.

Improved margins and tight cost control countered a recession-lead erosion of overall sales volume from £45.1 million to £40.9 million. During the year Acorn managed to move from an overdraft of £6.5 million to £1.4 million in the black. The previous year's losses were brought forward so that no tax was chargeable in the year 1991.

Acorn's recovery was not helped along, as has been the case in the past, by any extraordinary items outside the company's main business of selling computers, so the results can be regarded as reasonably impressive.

Advanced Risc Machines Ltd, the spin-off company co-founded by Acorn, Apple and VLSI Technology, has exceeded all of its targets and is performing well according to Acorn (see page 9).

Acorn subsidiaries in New Zealand and Australia both increased their market shares.

Acorn's chairman and director of corporate developments, Ernesto Musumeci, congratulated Acorn's employees around the world: 'They have been the key in achieving the company's successes in a period of economic recession. It is because of their quality and hard work that Acorn's principal shareholder, the Olivetti Group, continues to hold such confidence in the company.'

No dividend was issued to shareholders. However, upon the release of the results, Acorn's shares rose by 40 percent within two days. For further information, contact Acorn on (0223) 245200.

NEWS IN BRIEF

● **DURING** the nine months from April to December 1991, the BBC A3000 computer gained a 37 percent share of the UK schools' computer market, according to a report from the Research Support and Marketing Organisation. This is 6 percent up on last year and more than five times the share of any other computer.

Computer models from Research Machines, Apple, and IBM all failed to break the 10 percent market share barrier. It is now estimated the A3000 represents 15 percent of all the half-a-million-plus computers installed in schools. Acorn's new general manager of education, Peter Talbot, said he was delighted but not surprised by the figures. His former employers, Commodore, failed to show significant success in gaining a foothold with its computers in the education market, despite determined efforts.

● **A MAJORITY** stake in Newcastle-based Wild Vision has been acquired by Computer Concepts. Wild Vision is best known for its Hawk V9 digitiser and Chroma Series for the Archimedes.

Computer Concepts' Charles Moir told *BAU* that his company's relationship with Wild Vision means that the software team at CC's Hemel Hempstead HQ could continue with its software projects, like *Impression* and *ArtWorks,* while Wild Vision's hardware expertise would benefit from CC's software know how. 'It has become clear that the two companies complement each other very well,' commented Moir. Both companies are preparing for an expected boom in multimedia products later this year. Wild Vision's Peter Wild added: 'Not only will our relationship with Computer Concepts provide excellent software opportunities and financial advantages, but I believe that this turn of events will prove catalytic in giving Wild Vision's desktop video products a considerable step-up in the multimedia arena.' Both companies will continue to operate with their own corporate identities, but we can expect several joint ventures in the future.

RISC Developments Software

Desktop Thesaurus

NEW

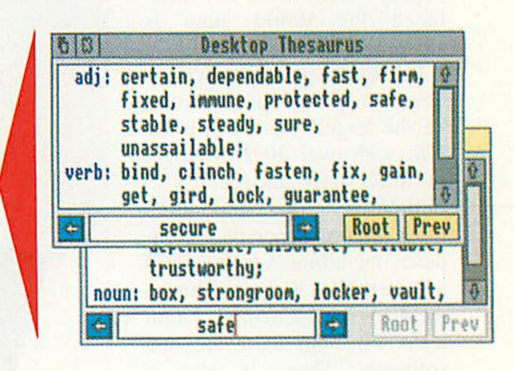


Desktop Thesaurus contains over 11,000 keywords and nearly 90,000 carefully chosen alternative words. It is ideal for developing language skills in the office, in school or at home.

The synonyms for the required keyword are listed in a scrolling window according to parts of speech, so nouns, verbs etc are grouped together. Clicking on any synonym itself then selects that word as a keyword and displays its synonyms, allowing you to browse through the data for the ideal alternative word. You can step back through earlier keywords, or step through the keywords in alphabetical order. When you have located an alternative word, it may be transferred instantly into almost any compatible application for you. Ideal for use with Ovation, Impression, Edit, Pipedream, 1st Word Plus, Pendown, Desktop Folio and other desktop publishers and word processors.

Desktop Thesaurus uses a compression system allowing the Thesaurus data to use disc space efficiently. Thesaurus data is accessed directly from disc saving valuable RAM, but is almost instantaneous from hard disc (a little slower from floppy disc).

Thesaurus data may be exported as plain text for editing, and the modified file re-imported into the Thesaurus. This powerful feature allows the Thesaurus to be easily modified or expanded. Due to the large size of the uncompressed data file, it is not possible to use this feature on a 1Mb RAM machine.

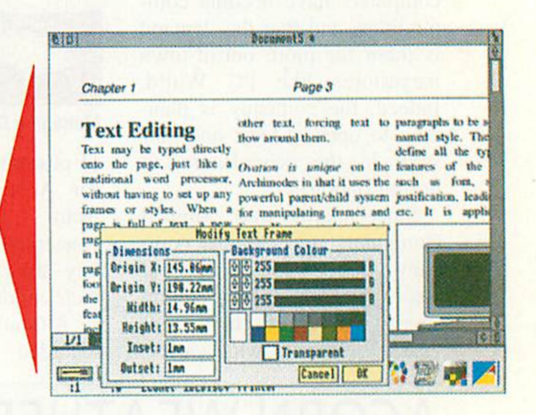


Price £19 + VAT **Site Licence Price £95 + VAT**

Ovation

Ovation sets new standards of quality and value by offering professional features in an easy-to-use package at a very competitive price. We guarantee that you will be able to produce high quality documents within hours of opening the package. Ovation provides a formidable array of desktop publishing features, yet can be used just like a traditional word processor to produce single page letters or entire books with complete ease. The package includes a 250 page user guide suitable for both novices and experienced users, a quick reference card, 7 outline fonts, and a range of clipart.

- *multitasking/multi-documents* • *full WYSIWYG display*
- *fast spelling checker (needs 2Mb)* • *variable views* • *headers/footers*
- *font size 1-1000pt* • *master pages* • *import draw & sprite files*
- *full colour support* • *linked frames* • *multiple columns* • *stylesheets*
- *definable frame borders* • *auto hyphenation (needs 2Mb)*
- *find & replace* • *line drawing* • *cut, copy, paste via clipboard*
- *dot-matrix & laser printer drivers*



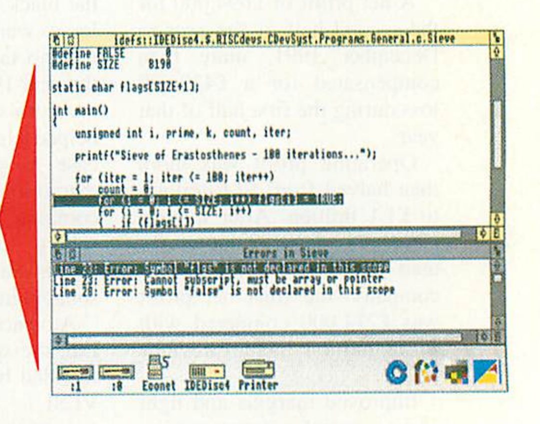
Price £99 + VAT **Site Licence £475 + VAT**

C Development System

The C Development System is a complete C language conforming to almost all of the ANSI specification. The package contains a compiler which is quick, easy-to-use and generates ARM code which may be linked to other programs using the linker.

Also included is a multi-tasking editor from which programs may be written, compiled and executed without leaving the desktop. In fact you can compile, link and run C programs at the press of a key. The compiler errors are automatically highlighted in the editor for easy correction making it ideal for beginners learning C.

The package also includes a range of RISC OS functions, a library manager for creating new libraries, a Make utility, and a built-in ARM assembler for advanced users.

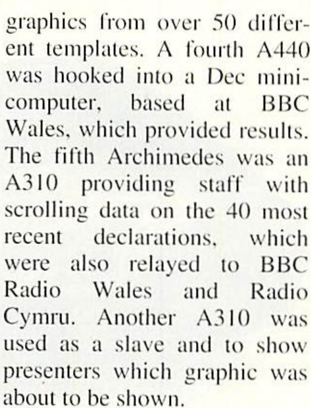


Price £77.39 **Site Licence £385 + VAT**

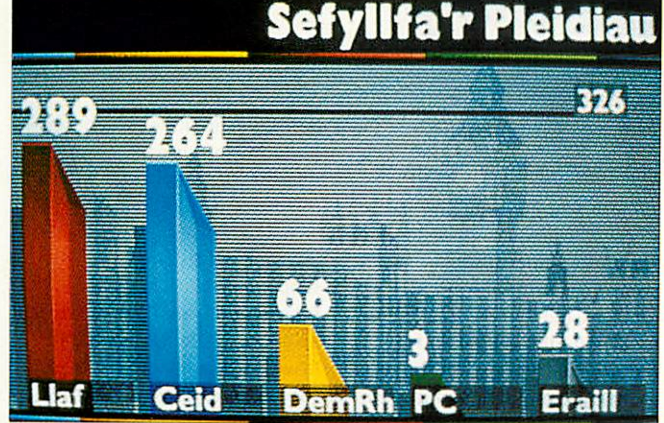
RISC Developments Ltd. 117 Hatfield Road, St. Albans, Herts. AL1 4JS Tel. (0727) 40303 Fax. (0727) 860263



ARC CHARTS ELECTION FEVER



WELSH television viewers enjoyed Archimedes-generated graphics to show the results of the recent general election. BBC Wales decided to go for an unorthodox and more cost effective solution than the usual *Quantel Paintbox*-based system for generating animated on-screen graphics. The Cardiff-based company, Now Motion, was chosen and it used six Arc machines. Three Arm3-fitted A440s were connected to a Millipede Prisma 3 high-resolution graphics board; one provided a headline flashed on a strip along the bottom of the screen, while the other two generated full-screen graphics from over 50 different templates. A fourth A440 was hooked into a Dec minicomputer, based at BBC Wales, which provided results. The fifth Archimedes was an A310 providing staff with scrolling data on the 40 most recent declarations, which were also relayed to BBC Radio Wales and Radio Cymru. Another A310 was used as a slave and to show presenters which graphic was about to be shown.



Election graphics created with the Archimedes-based system

The software, all running under Risc OS, was written by Now Motion's Carl Blundell. He explained why he chose a system based on the Arc: 'Conventional TV graphics tolls, such as Quantel, cannot produce animated bar charts without considerable manual effort. However, Acorn's multi-tasking desktop environment provides a powerful graphics environment'.

WATFORD WINS BUSINESS AWARD

MAJOR Acorn dealer, Watford Electronics, recently won £500 and a cut glass trophy for finishing first in the Marketing Innovation section of the Hertfordshire Business Awards.

The competition was organised by Hertfordshire Training and Enterprise Council (TEC).

Watford Electronics was cited for stepping up its investment in research and development despite the onset of an economic recession.


Watford Electronics' MD, Nazir Jessa (centre) receives the award

QUEEN'S AWARD FOR ARM CHIP

ACORN has won its second Queen's Award for Technological Achievement. The award is for the development of the 32-bit Arm (Acorn Risc Machine) microprocessor now installed in over 180,000 Acorn Archimedes computers. Work on the Arm chip first started back in 1983.

Working samples were available by 1985, several years before the rest of the industry decided that similar technology was the way forward. Risc (reduced instruction set computer) technology is now the leading growth area in computing. Arm chip development is now handled by the Acorn spin-off company Arm Ltd, jointly owned by Acorn, Apple Computers and VLSI Technology.

Unlike most of its more recent Risc competitors, the Arm chip remains very compact and requires relatively little power, making it ideal for portable computing applications. The Arm is also easily customised.

Acorn first won the Queen's Award back in 1983 for the design of the original BBC micro. Acorn's managing director Sam Wauchope commented: 'The Arm processor represents a major step forward in computer technology and all of us are very proud of this achievement.'

NEWS IN BRIEF

● **A NEW** software package designed specifically for school physical education departments has been produced by Selective Software of Street, Somerset. The package, called *SportsDay*, helps in the planning and organisation of a sports event. Teams, competitors and results can all be managed by the computer and there are hard copy options for scores, and so on. It costs £22.50. Contact Selective Software on (0458) 43079.

● **AVATAR**, a new multi-user role-playing fantasy game running on a single Archimedes 440, has become available on the Silicon Village online viewdata service for computer enthusiasts. The game itself is a hybrid of Assembler and compiled Basic. Players assume the role of a 'godling' character which has to accumulate wisdom and other attributes and develop into a 'full god'. Eventually the system will be connected to Silicon Village via an Ethernet link.

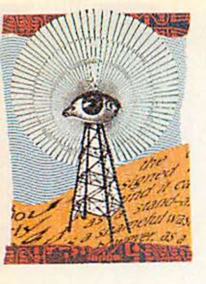
To access the Silicon Village demonstration service, set your comms software to viewdata and dial 081-756 6996 using an ID of ten 4s and a password of four 4s.

● **SOFTWARE** developers and educational establishments are being offered a mastering service based around Acorn's recently launched Replay multimedia 'movie' software. Replay-compatible ARMovies can be produced by Cardiff-based Uniqueway Ltd from a variety of source-media including video tape or film.

A wide variety of video tape formats is supported. Completed ARMovies are supplied on magneto-optical disc or hard disc. Turnround can be as fast as 72 hours for short movies. The service costs a basic £100 per minute, with a minimum charge of £300 or £200, depending on the source media. Fast 25 frames per second movies are slightly more expensive.

Uniqueway points out that Acorn Replay movies are much higher quality than Apple's rival QuickTime technology for the Apple Macintosh.

Contact Uniqueway Ltd on (0222) 615782.



'ION' OUT IMAGING PROBLEMS

CAMBRIDGE Software House has gained exclusive initial supplies of Canon's latest still-video camera, the Ion RC560.

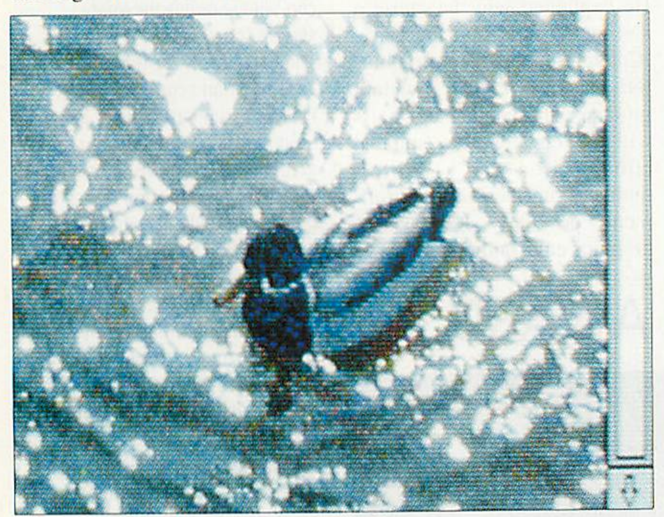
The first shipments of the new camera – which will lie at the heart of CSH's new ColourMaster Professional digitising system for the Archimedes – have just arrived in Cambridge.

The Ion RC560 features a number of improvements over the original RC260 model. An enhanced picture mode is now supported which effectively provides an interlaced picture, although this does halve the camera's 2.5in magnetic disc storage capacity due to the larger amount of data. A 3× zoom lens with autofocus now replaces the fixed focus, fixed focal length lens. An infra-red remote control enables the user to arrange pictures so that several can be printed together.

ColourMaster Professional includes the Ion RC560 camera, infra-red remote, a high quality video digitiser, a 35mm transparency copy holder, cables plus software. The retail price is £2250 plus VAT or £1995 plus VAT for education. For more information contact Brian Richardson at CSH on (0480) 67945.



The CSH digitising system is based around the new Canon Ion camera



A picture 'grabbed' using the new Canon Ion camera

SEE CADET

MINERVA Software is to release *CADet*, a 2D computer aided design (CAD) package suitable for educational use, later this month. The package is fully multi- tasking and uses Risc OS printer drivers for output. It also includes HPGL plotter support for up to A3-size pages.

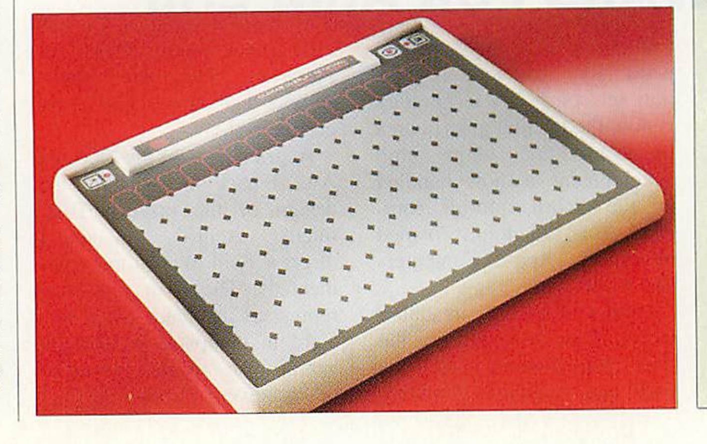
There is a user-definable symbol library for all those strange shapes, and fill types include several used in Ordnance Survey maps, such a trees, grass and swamps. Drawings can be imported and exported as *Draw* files and files such as those from *AutoCad* can be imported. *CADet* will cost £149 plus VAT. Contact Minerva Software on (0392) 437756.

TRY BEFORE YOU BUY

POTENTIAL purchasers of the Oldham Overlay Keyboard for BBC micro or Archimedes computers can now try it out before they buy.

Simnett Computers is offering this year's British Educational Technology award winner on 30 days sale or return to schools.

The Oldham board costs £120 plus VAT. For further details of the offer contact Simnett on 081-680 3830.



NEWS IN BRIEF

● **SUNNYHURST** Software in Lancashire has produced a low cost disc containing *Draw* files designed for use by pupils at key stage 2. The idea is that these drawings can be used to gain experience and confidence with *Draw*. The Draw_Ideas disc is priced at £4.50. For further details contact Sunnyhurst Software at 3 Earnsdale Avenue, Darwen, Lancs BB3 1JW.

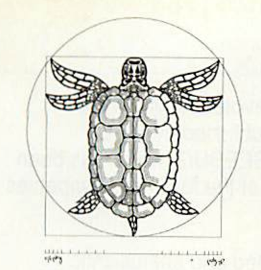
● **ARM LTD** has announced that the latest member of the new Arm6 Risc processor family, a development of the same processor technology used in Acorn Archimedes computers, has been completed in record time.

The new Arm610 was initiated in November last year and first supplies were delivered in February this year. The Arm610 is an optimised design, which leaves out the maths co-processor interface, delivering 15mips performance at a clock speed of 20MHz, which is faster than the Arm3 used in Acorn's A5000 and A540 computers (13.5 mips at 25MHz).

● **CALLING** all EMR software users. Club A3000, in association with Archimedes music specialists EMR, is to hold a masterclass/tutorial for users of EMR Studio 24+ software. EMR's Mike Beecher will be there to help users brush up their Studio 24+ skills. A limited number of seats are available for the event, which will take place at Mill Hill School in London on Sunday May 17. For further details contact Rene Barreto on 081-445 2126.

● **COLOUR** has been added to the capabilities of the nine- and 24-pin dot matrix Panasonic QuietPrinter range. A seven-colour palette – including magenta, blue, violet, yellow, red and green – is now optional for KX-P2123 (£340) and KX-P2180 (£270) printers. Contact Panasonic on (0344) 853915.

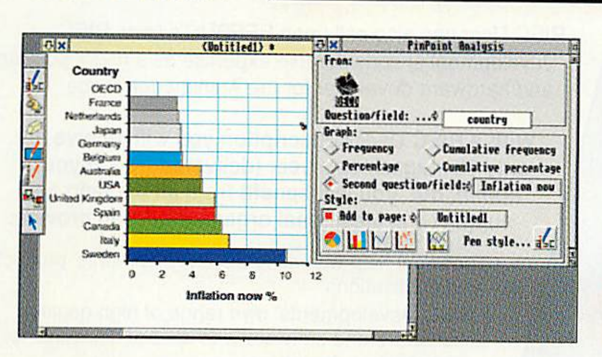
● In *BBC Acorn User* last month we stated that Teleview was distributed by SJ Research. In fact, it is being distributed by the Dudley Education Centre. Tel: (0384) 634155.

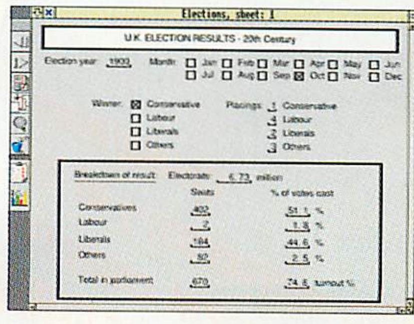


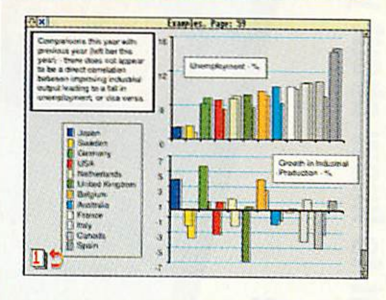
LONGMAN LOGOTRON

PinPoint

> "The ease with which data collection may be organised and implemented is a joy."
>
> Frank Jukes, Micro User, January 1992

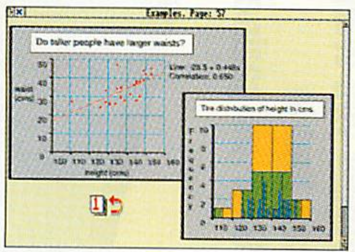


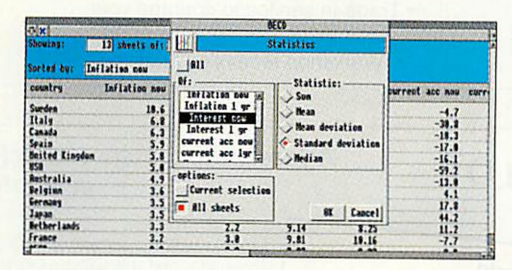


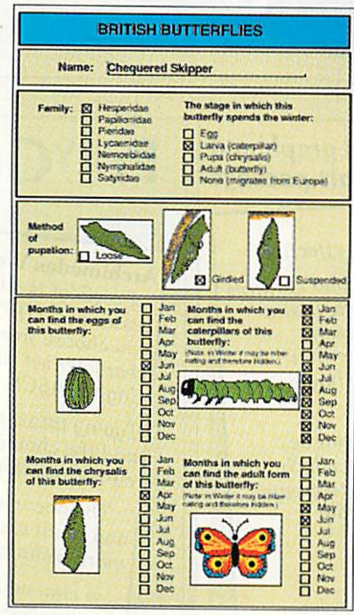


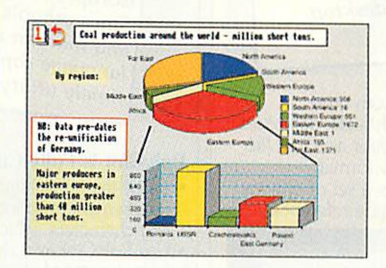


> "*PinPoint* is certainly a new generation database, making the handling of data as easy as it should be. Its concept and execution is brilliant — data handling is about collecting data efficiently, and that is what *PinPoint* does. *PinPoint* is powerful yet simple to use and will take educational data-handling into a new era."
>
> Dave Futcher, BBC Acorn User December 1991







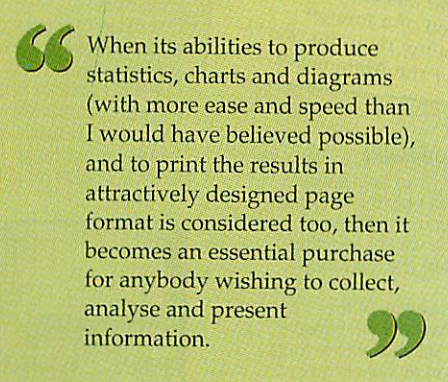




> "Has Longman Logotron developed a new form of database altogether? In one word yes. To call *PinPoint* a mere database, or even mildly more boastful, a new generation database, is to diminish what in truth is a revelation."



> "The scope and variety of *PinPoint* is quite astonishing. The sheer variety, the power, the complexity of this program is astounding. The analysis and display aspects are both powerful and attractive enough to operate in both an educational and business environment. Databases will never be the same after this."
>
> Duncan Evans, Archimedes World December 1991

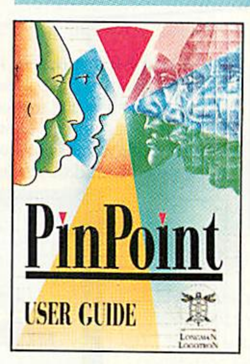


> "*Pinpoint* takes databases into a new dimension in several ways. First, form design. *PinPoint* is about as adaptable as the best desktop publishing package when it comes to creating the form upon which information will later be entered and stored."

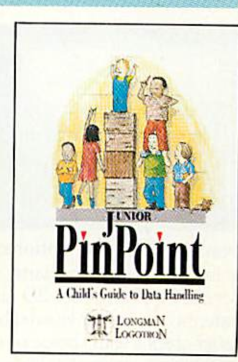
> "When its abilities to produce statistics, charts and diagrams (with more ease and speed than I would have believed possible), and to print the results in attractively designed page format is considered too, then it becomes an essential purchase for anybody wishing to collect, analyse and present information."
>
> Chris Davies, Times Educational Supplement, November 1991

Longman Logotron
124 Science Park
Milton Road
Cambridge CB4 4ZS.

Tel. (0223) 425558
Fax (0223) 425349

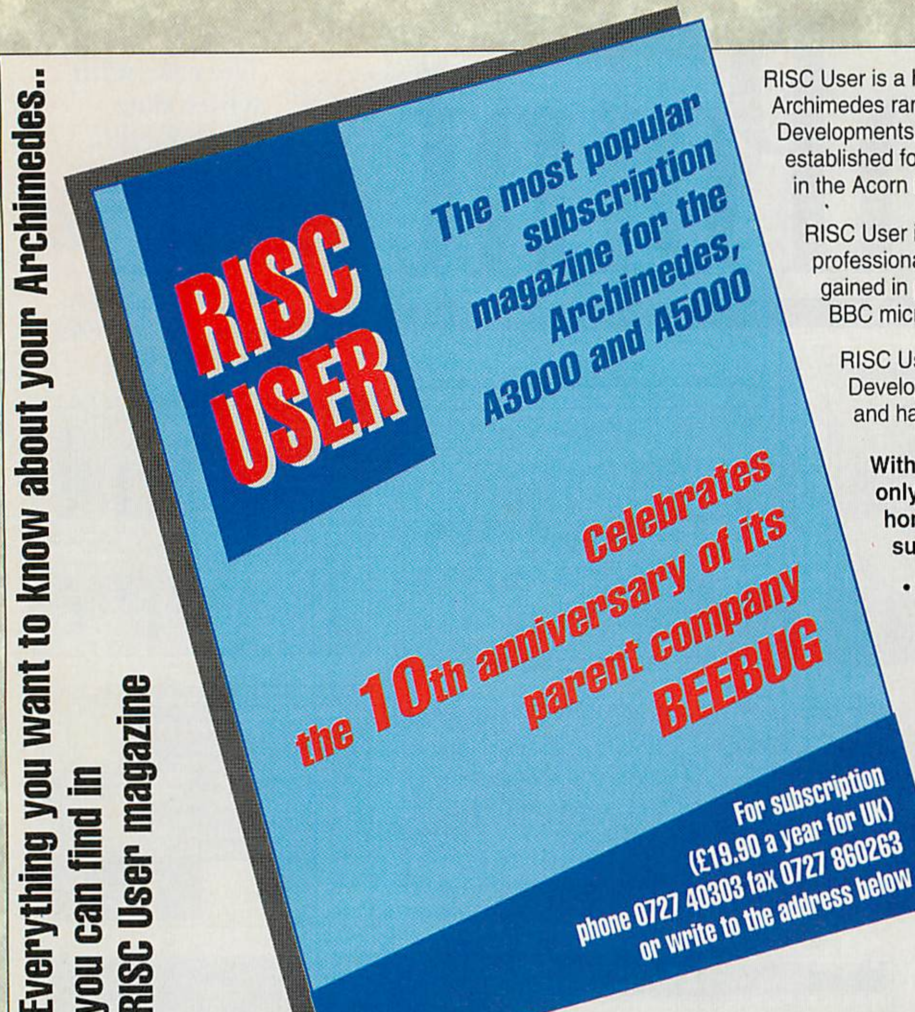


PinPoint for the Acorn Archimedes is priced at £99. A Site Licence costs £400.



A special version for primary schools is priced at £24. A Site Licence costs £72.

Everything you want to know about your Archimedes.. you can find in RISC User magazine



RISC User is a high quality magazine devoted totally to the Archimedes range of computers. It is published by RISC Developments, formed last year from BEEBUG, which has been established for over ten years as one of the foremost companies in the Acorn market.

RISC User is produced by a dedicated and enthusiastic professional team which benefits from10 years of experience gained in publishing the popular BEEBUG magazine for the BBC micro and the Master 128.

RISC User can also call upon BEEBUG's (now RISC Development's) considerable expertise as a major software and hardware developer for the Archimedes range.

With a RISC User subscription you will receive not only 10 magazines a year (delivered free to your home), but you will benefit from all the help and support a professional organisation can provide:

- Technical help with all RISC Developments' products and publications
- RISC Developments' own range of high quality hardware and software with special discounts for magazine subscribers
- Showroom with friendly professional staff, where you can try out the latest software and hardware
- Retail catalogue, mailed free to magazine subscribers, with regular updates on new products
- Tele-sales operation, where you can get technical guidance about your software or hardware requirements
- Speedy mail-order service
- Trade-in service to upgrade your equipment
- Workshop repairs by qualified staff

ChartWell

A sophisticated graph and chart package

Acorn User
...ChartWell: simple but effective.

ChartWell scores on simpler controls over the basic graph types. It also has enough effects to present material prettily at a price that makes it attractive to the home or school user.

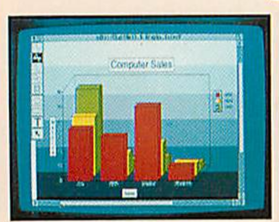
...All the options chosen can be saved in a 'Style Sheet file which makes it remarkably easy to create the same type of graph again...

Archive
...This program from RISC Developments uses a really clever approach exploiting the desktop philosophy to the full.



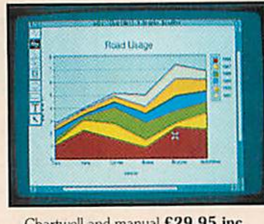
ChartWell offers **24 different graph types**: horizontal and vertical bar charts line graphs scatter charts polar plots and pie charts.

Complete user control over: choice of colour, data point styles, bar widths and spacing, use of titles and labels, legends to provide a key, graduated/shaded backgrounds, scales and tick marks, etc.



Data can be imported from other applications, such as spreadsheets, databases, or created with a suitable editor as a text file. **Output** is in standard Draw format. Use of **'style sheets'** allows a set of options to be saved with data for future reference.

A variety of display options: flat or 3D bar and pie charts, user choice of angle for 3D display, clustered, stacked or layered bar charts, scatter graphs with choice of curve fitting techniques, regression lines and correlation coefficients, and use of error bars, line graphs with choice of normal, cumulative area or stacked area displays.



Chartwell and manual **£29.95 inc** +2.00 p&p Code **PCHWa**

PolyGlot

A foreign language character generator

Archimedes World
...PolyGlot is a helpmate for wordprocessor and DTP software...which lets you choose from a European language character set rather than plain old English ASCII.

Typing into a document is very simple and the character appears at the cursor position when you click on it...

...The documentation is pretty good and a full explanation is given for the more technical areas.

... a vital add-on for a text editor, wordprocessor or a DTP program. Since schools and businesses are more and more in need of a foreign language capability, than this is a timely utility for the Archimedes.

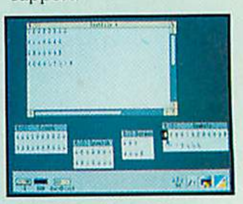
Open a window for any specified language, and this will display all characters which are impossible or difficult to obtain from the keyboard: for example, accented characters in French,or umlauted characters in German. Select any of these characters with the mouse and it will automatically be inserted into your document.

Why PolyGlot is better than any other system

- Characters are displayed in both upper and lower case
- No need to set your keyboard to a foreign standard to obtain foreign characters.
- Use different languages or alternative character sets simultaneously.
- Use any character set, any alphabet and even scientific characters (provided your fonts support these).
- Comprehensive printing support.

PolyGlot is Fully Customisable

- Tailor the application to your own specific requirements and include only the languages and characters, which you actually need.
- Use PolyGlot as a simple way of selecting from any set of characters, i.e. currency signs or other symbols.
- Customise PolyGlot to use any of the available alphabets within your Archimedes (for this you must have suitable outline fonts or printers which support alphabets other than the standard Latin1).
- Ideal for education where the package can be readily tailored to suit the needs of individuals and classes.



PolyGlot and manual
Price **£19.95** inc + £2.00p&p
Code **PGLTb**

RISC Developments & BEEBUG Ltd. 117 Hatfield Road, St Albans, Herts, AL1 4JS. Tel. 0727 40303 Fax 0727 860263



PRIMEART GOES HI-RESOLUTION

MINERVA Software's art package for primary and special needs students, *PrimeArt*, has been modified for use with mode 21 on the Archimedes.

Minerva says that, as far as it it aware, *PrimeArt* is the only program of its type to work in this mode, making it ideal for users lucky enough to have a hi-res multi-scan monitor. Mode 21 has twice the vertical resolution of Mode 15, meaning that pictures will look more 'real'. *PrimeArt* costs £79.95 plus VAT.

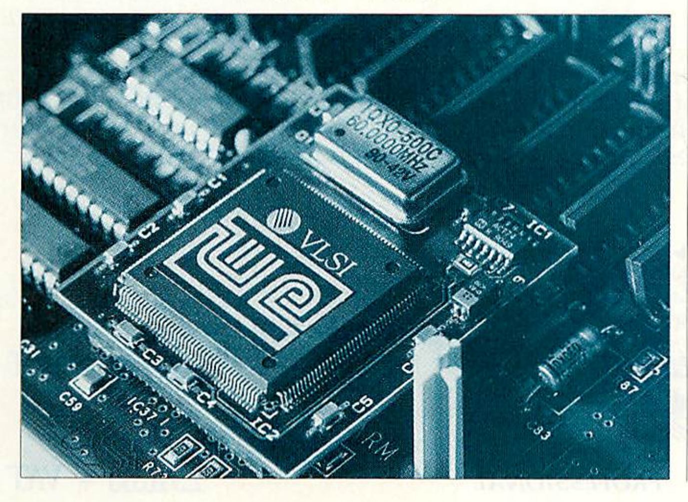


ARM 3 GOES FAST!

CONGRATULATIONS to Mr J F Lakin of Solihull, who has won a Watford Electronics Arm 3 upgrade board, offered in the exclusive competition we ran in our February issue.

His winning catchphrase was: 'I would like to have a Watford Arm 3 in my machine because ...it's so fast, it's just a dream, please can I have it in my machine!'

The correct answers were: 1) B 2) The A540 3) Luton. Our thanks to all of you who entered.

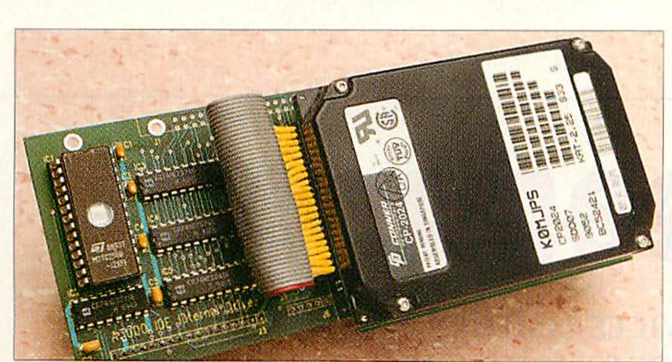


REPLAY CD

ACORN'S new Replay system has been utilised for the first time in a commercial multimedia CD Rom publication, *The Dictionary of the Living World* from Media Design Interactive. The disc contains over 2,500 text entries, 1,000 illustrations, 100 animal sound sequences and 100 Replay video clips. *The Dictionary of the Living World* has been ported over from the Apple Macintosh where it has been a great success.

All data types can be exported to hard or floppy disc as stand-alone data for use in other applications. A full set of National Curriculum-based teacher notes is available, although MDI hopes to sell the disc to individuals for home use as well. It costs £175 from the distributors, Optech. Tel: (0252) 714340.

THANKS FOR THE MEMORIES



One of new the A3000 internal drives from CU Electronics

NEW MEMORY upgrades for A5000 and A3000 computers plus an IDE hard drive for the A3000 have been announced by Stockport-based CU Electronics. The new 1Mb A3000 Ram upgrade is a very compact device priced at £40. The 2Mb A5000 RAM upgrade is priced at £95. The range of A3000 internal hard drives starts with the £189 20Mb unit.

Contact CU Electronics on 061-476 0576.

NEWS IN BRIEF

● **SHARP** eyed readers who may have perused the PC press recently might have spotted Computer Concepts advertising for PC Dos programmers. Speculation that a PC version of the *Impression* DTP package is planned was squashed by CCs' managing director, Charles Moir. 'It would be technically impossible to port *Impression* to the PC,' he said. However, it's known that the company's new *ArtWorks* drawing package has been structured with a view to portability. Moir added: 'I would just like to reassure everyone that Computer Concepts is not about to abandon the Archimedes software market or anything like that, but we do have to keep an eye on what's going on in the PC world.'

A positive view is that CCs' commitment with Wild Vision (see separate story) to producing multimedia products for the Archimedes has generated a requirement for PC expertise to ensure 'industry standard' compatibility is retained in the development of new products, where it is believed necessary.

● **NORTHWEST SEMERC** (Special Education Micro Electronics Resource Centre) in Oldham has announced two special needs initiatives aimed at the Archimedes.

The first is ArcTracker, a ruggedised tracker ball for users with motor control or learning difficulties. Special buttons are provided to execute 'double-click' responses with just one press. Such users should find theArcTracker much easier to use than a conventional mouse. It costs £269 plus VAT.

Northwest SEMERC has also been awarded NCET funding for the production of a special needs CD-Rom publication. In partnership with CD-Rom specialists Cumana, SEMERC will research and publish a CD-Rom-based special needs curriculum guide called the *Special Needs Resources Disc*.

The CD-Rom will feature high resolution photographs, diagrams and audio tracks. The target publication date is March 1983. Contact Northwest SEMERC on 061-627 4469.

SQUIRREL



THE REVOLUTIONARY NEW DATABASE FOR ARCHIMEDES COMPUTERS



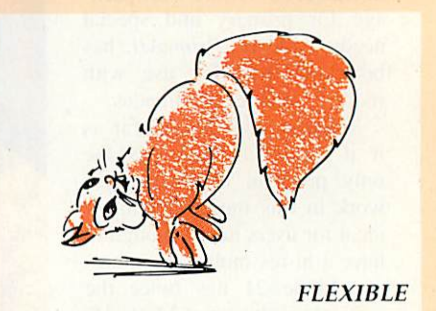
FRIENDLY

Squirrel is the easiest to use database yet, allowing simple point and click database creation and queries.



FAST

Modern indexing techniques mean superfast searches every time.



FLEXIBLE

Images, text and sound may be stored in the same database



NETWORK COMPATIBLE

Client/server design ensures that squirrel runs just as well on networks as standalone.



INTELLIGENT

Squirrel understands days of the week, months of the year and recognises files from other popular packages.



COMMUNICATIVE

Queries may be made onto other popular computers such as an IBM or Macintosh, even remotely over telephone lines.



REPORTING

Fully relational reporting with an entirely new graphic approach to data selection.



PROFESSIONAL

Quite simply, the most professional database for Archimedes users.

Single User Version
£129.00 + VAT

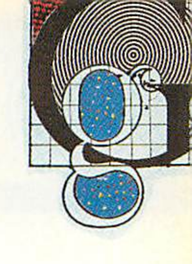
Econet/Site Licence
£516.00 + VAT

Suitable for Acorn A3000, A310 and A400 Series.

AVAILABLE NOW

digital services

DIGITAL SERVICES LIMITED
9 WAYTE STREET, COSHAM, PORTSMOUTH, HANTS PO6 3BS
TEL (0705) 210600



IMPROVED TITLES

CLARES has recently released a presentation package to complement their suite of graphical software for the Archimedes. *Titler* has been designed to simplify the creation of video titling and presentations. The program is divided into two main sections – Titler and Sequencer. Titler is used to design screens using text, sprites and draw files.

Titler simplifies video titling and presentation

Text can be placed anywhere on screen in any outline font. Effects such as drop shadows and underlining can easily be incorporated into your designs.

Sequencer allows groups of screens to be linked together to form complete presentations. In addition, a host of other screen types can be incorporated into sequences, including *ProArtisan, Illusionist* and *Render Bender* files. Music and sound effects can be implemented by including *Tracker* tunes or *Armadeus* samples. Titler costs £127.62 plus VAT. With a Wild Vision Genlock podule it costs £293 plus VAT. For our full review, please turn to page 99.

ICONS IN HI-RES MODE

ONE OF the visual differences between Risc OS 2 and 3 is the ability of the latter to display high-resolution icons in high-resolution modes.

If you look inside the most recent application directories, you'll find three separate sprite files labelled Sprites, Sprites22 and Sprites23.

Sprites contains mode 12 sprites for low resolution modes, Sprites22 contains mode 20 sprites for high resolution colour modes and Sprites23 contains mode 23 sprites for the ultra-high resolution mono mode.

The suffixes 22 and 23 refer to the aspect ratio of the pixels used in a particular mode: mode 20 uses square pixels, so icons from Sprites22 (2x2) would be displayed.

Risc OS 3 automatically selects the correct icons for whatever the mode is, providing they are included in an application. None of this information is mentioned in the documentation supplied with the A5000 (the only machine at present to have Risc OS 3).

Another Risc OS 3 'secret' is its ability to alter the appearance of windows themselves. Buried deep inside the Apps directory (which is part of Risc OS 3) is a sprite file containing all the shapes necessary to 'build' windows. It can be transferred from Rom on to disc by the following actions.

First, open the root directory of Apps by pressing the menu button over the Apps icon and select Open '$'. Open the Resources directory by double clicking on it and then open the Wimp directory by doing the same. Copy the sprite file Tools by dragging from the Resources filer window to another filer window, such as a floppy disc.

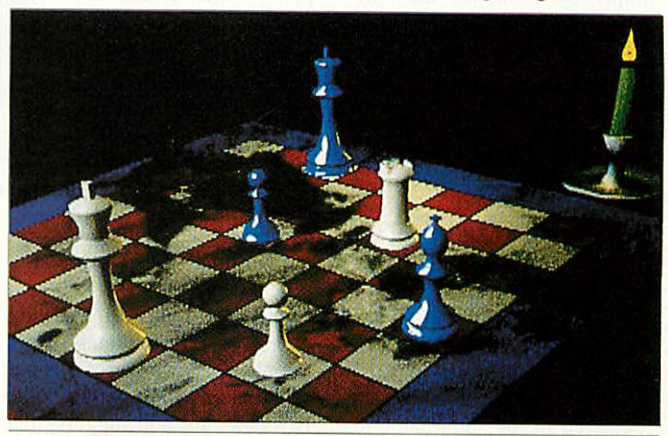
Like application icons, different sprites are used depending on the mode you are in, so each sprite in the Tools file is suffixed with a number denoting the pixel ratio used. Any sprite can be altered using *Paint* and then re-saved. It is of course impossible to save a file to Rom, so the new Tools file is saved inside the System directory on a hard disc.

An altered Tools file (with new 22 sprites) has been included on this month's subscriber's disc for you to create your own. It also contains sprites not found in the original Tools file.

READER PIC OF THE MONTH

CHESS seems to be the theme for our pic of the month slot this month. The picture of the chess board below comes from David Hoskins and was produced with *Illusionist*, the rendering application. It is not ray traced believe it or not.

David was actually responsible for writing Clares' *Render Bender 1 & 2* and *Illusionist* programs so its no wonder that he can produce such stunning images.



NEW PRICE FOR PRO-IMAGE

IRLAM Instruments have reduced the price of their Epson flatbed scanner following new pricing policies from Epson. Irlams A4 ProImage scanner is now £999.

Also, due to the enhanced parallel interface found on the A5000, owners of Acorns newest machine do not need to buy the IEEE interface card; this saves £98.50. Users however might like to buy a printer switching box which costs £26.30. Irlam Instruments, (0895) 811401.

SUPER DRAW READY

4MATION's 'super Draw' program, *Vector*, is due to be released shortly. Based around the well-known public domain program, *Draw1½*, the 4Mation program has all the tools provided in Acorn's *Draw* and much more.

An on-screen help facility gives information regarding which tool is currently selected and what the last action was. For example, typing in a line of text will give a message saying what font has been used, the size of font and the position of the text.

A library is used to store commonly used objects and this is held within the *Vector* application directory and can be added to at any time. Different libraries can be loaded with *Vector* depending on the type of drawing being produced. A circuit design library, for example, might contain a selection of different component symbols used in such a diagram.

Layering allows a drawing to be split into a number of separate parts, each of which can be super imposed on to the complete design. Each layer can be coloured differently to help distinguish them from the others in a drawing. Alternatively, any layer can be viewed on its own.

Although *Vector* is written to work on any 32-bit machine, auto-kerning for text, sprite and text rotation, colour dithering and the text-to-path tool will only function with Risc OS 3.

However, 4Mation does not see this as a problem as the company expects the majority of users to upgrade their machines when Risc OS 3 becomes more available.

Vector will cost £85 plus VAT (a site licence is included in the price). For further information, contact: 4Mation, 14 Castle Park Road, Barnstaple, Devon EX32 8PA. Tel: (0271) 25353.

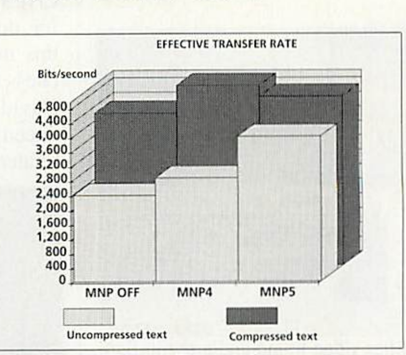


SPEED IS OF THE ESSENCE

IF you use a modem which features error corrections and compression, then it may be news to you that your transmission rate could be doubled, simply by changing the way that you transfer files.

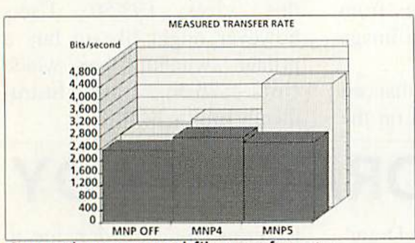
It is important to know how to set up your modem correctly according to the type of file you want to up or download. The graphs show the same text file file transferred in two different forms; compressed and uncompressed, the former using David Pilling's *Spark* utility.

It may seem obvious that a 30K text file compressed to 16K will take just over half the time to be up or downloaded compared to the same uncompressed file. According to graph showing the effective transfer rate, that's how it is if your modem either has no compression facility (MNP5 or V42bis) or compression is switched out. Turn compression on, in this case MNP5 and look what happens – the effective transfer rate of the compressed file falls slightly, though the uncompressed text file transfer speeds up as you would expect. The explanation is simple – MNP5 can't compress an already compressed file but it can waste time trying.



Comparing effective file transfer rates

The graph showing measured transfer rates shows the physical number of bits per second that pass between the two modems, and suggests that the uncompressed text file is way ahead in terms of speed under MNP5, but in reality the compressed file is the most efficient form for file transfer as long as compression is switched off.



Comparing measured file transfer rates

Incidentally, the two graphs illustrate a marked speed benefit between MNP4 (error correction mode) and no MNP settings. This is because when MNP is on communication is synchronous, or clock driven and start and stop bits required in asynchronous mode can be discarded, giving a useful 20 percent reduction in data transmission volumes.

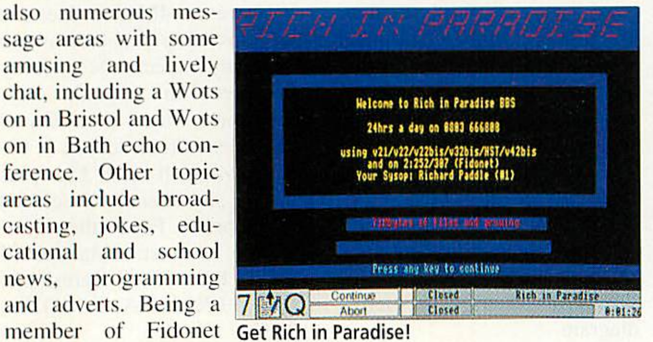
As a general rule, if you're logging on to a host system offering MNP connection, MNP5 is best for just looking around or transferring uncompressed files if you have to. For ultimate file transfer speed, ensure your files are compressed and MNP5 is switched off, but MNP remains on.

Our example shows a typical best case of almost 5,000 bits per second – more than double the rated speed of the modem. Some compressed files will go even faster!

THE BB OF THE MONTH

THIS month I have chosen to take a look at Rich in Paradise BB which supports the Fido network. The file areas are neatly indexed for ease of use and contain such headings as comms, sound samples, demos, *Draw* files, games and utils. There is also an area for BBC B files, although at present there are not that many BBC files available. There are also numerous message areas with some amusing and lively chat, including a Wots on in Bristol and Wots on in Bath echo conference. Other topic areas include broadcasting, jokes, educational and school news, programming and adverts. Being a member of Fidonet allows Richard to include the Acorn support database area which many bulletin boards are now sharing.

Rich In Paradise is run by Richard Paddle and is based in Paignton. It caters for all speeds up to v32bis and HST, including v42bis. Rich in Paradise can be called on (0803) 666808 with your comms software set to ANSI, 8N1.



Get Rich in Paradise!

STAR-NET UPDATE

REGULAR readers of this column will no doubt be familiar with Star-Net, which incorporates School-Net. Now Paul Welbank, the Sysop, has expanded the system to include Fidonet echos and extra support for schools.

School-Net UK consists of 12 channels devoted to ongoing inter-school projects covering such topical subjects as weather data collection, global village news and a Star Trek role playing game.

School-Net can be accessed on (0603) 507216 set to 8N1 and further information, including a printed newsletter, can be obtained by writing to Paul Welbank, Eaton (City of Norwich) School, Norwich NR4 6PP.

NEWS IN BRIEF

● **MIRACOM** has just announced a new improved version of its popular WS3000 v22bis modem. Featuring MNP levels 4 and 5 and retailing at £345 plus VAT, *Miracom is aiming the new modem at the 'casual cost-conscious modem user'*. The standard WS3000 will now retail for £195 plus VAT. For the more enthusiast comms user, Miracom has also launched a range of V32bis modems. The Courier V32bis costing £695 plus VAT is now 50 percent faster than the standard Courier V32 at £595 plus VAT. Contact Miracom on (0800) 225252.

● **HAYES** has just announced details of several new modems. The new Ultra range starts with the Ultra 24 with Express 96. This is a V22bis modem that can connect to all V21, V23, V22 and V22bis modems, in addition to any other Express 96 modem, to allow V42bis data compression. This can provide an effective throughput of up to 25,000 bps. Their top model is the Hayes Ultra 144 – a full V32bis (14,400bps) modem.

● **ANDEST** Communications has just launched the first truly portable V32 modem. The RoadRunner Quin Fax modem features all speeds up to V32, includes V42bis and MNP4 & 5 and can even send and receive faxes. Costing £599 plus VAT, the surprising thing is its size; hardly bigger than a cigarette packet. Contact Andest Communications on (0908) 263300.

● **SADLY**, from April the Orb BB will be closing down. For five years, Orb has been the HQ for the XFS BBC B host system. Two systems still supporting XFS are Viking East Anglia on (0255) 503048 and Connections BBs in London, on 081-903 1309.

● **THE** French Minitel system is set to expand into the Netherlands. French Minitel users will also be able to link up with Dutch videotex services by dialling 3619 – the number of the international Teletel kiosk.

QUESTIONS AND ANSWERS

Q Chris Brett of Surrey has a problem printing *Draw* files using an Epson LX400 and asks if there is any way of positioning the drawings at the top of the page without the printer ejecting a blank page of paper first.

A **By default, *Draw* will position your diagram in the bottom left hand corner of the page, so before you start to use it ensure that you move the scroll bars to the top of the paper. Also, make sure that you have selected the correct paper size that you want to print out to. This is usually A4, but can be changed from *Draw*'s Paper limits menu.**

From the same menu it is also worth checking whether you have Portrait or Landscape mode selected. This option will determine which way up the picture will be printed – either horizontally or vertically.

Lastly, after loading your printer driver, selecting Show from the Paper limits menu will actually show you the printer driver margins as a grey area around your *Draw* window. This will let you see if any parts of your diagram fall off the physical page set by the printer driver's defined page size.

Of course, because this is not printed, it can also be quite useful for use as a scratch pad.

Q Mr Brannan of North Humberside asks if it is possible to play games using Atari type joysticks on an Archimedes and if so, where does the interface plug in ?

A **QD Enterprises manufacture such an interface, allowing you to plug in two standard Atari joysticks. The interface plugs into the Archimedes' parallel printer port and not the serial port.**

There has been some confusion over where it plugs in because the company The Serial Port was originally part of QD Enterprises who sell the joystick interface, hence it was referred to as The Serial Port joystick interface. These two companies are now, in fact, separate. The Serial Port is still based in Wiltshire (0749 670058) and sells the popular communications package, *ArcTerm7*, together with a range of hard drives. You can order items via The World of Cryton BB.

QD Enterprises now encompases new label Vertical Twist also based in Wiltshire (0373 824200) and is selling existing products such as the joystick interface, and the Pcats graphics enhancer. The joystick interfaces provides a small switch to toggle between the printer and joysticks, so that you don't have to keep unplugging the leads when you want to use your printer.

Q Paul Badham of Stafford has an interesting query regarding software protection and would like to know how to copyright a program that he has written.

A **This is actually quite simple, as any program is automatically your copyright as soon as you write it. Including a REM line near the beginning will clarify this fact to anyone who actually lists the program.**

One popular way of copyrighting a program is to send a copy of the program disc through the post to yourself, using recorded delivery. Then keep the package in an unopened condition. If anyone copies your program and tries to make it theirs, you can provide proof that you had the program on a date prior to them.

Q Mr B. Clarkson of Western Australia has encountered some problems using a Canon BJ330 printer plugged into his Archimedes A410 via a Computer Concepts dongle, used to run *Impression*. He asks why his printer should lock up if it is off-line when Print is selected from the Archimedes, and then turned online after the Archimedes has started printing.

A **The answer here probably lies in the fact that when the Archimedes starts printing, the first thing it does is send all the control modes to the printer to set it up. For example, if you are printing graphics, it first sends the control codes to tell the printer to go into graphics mode, set the dot resolution, line spacing etc.**

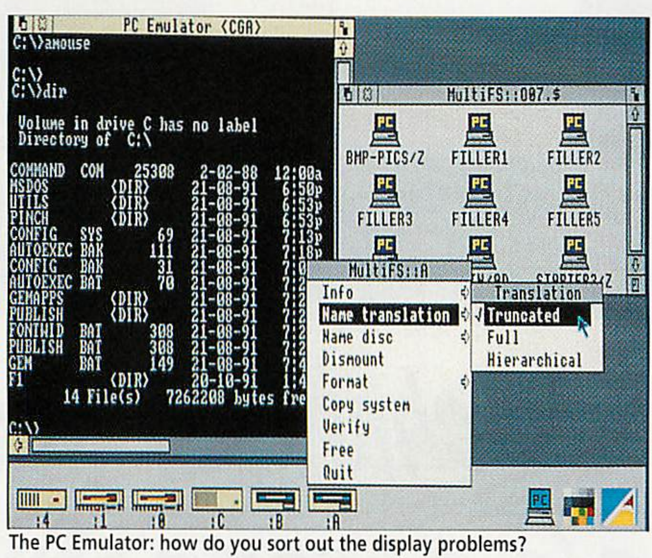
It then starts sending the picture itself. As the computer is capable of sending data a lot quicker than the printer can handle it, the computer has a buffer to hold any surplus data until the printer can process it. If the printer is offline, then the buffer will quickly become full, resulting in the computer hanging up. Sometimes, turning the printer on now will result in some of the intial control codes being lost, which will mess up the printout. If you press ESCAPE at the Archimedes end, you should be able to flush the buffer and unfreeze the computer.

To reset the printer, as it is still under the computers control, is to turn it off and on again. You may then get a few lines of garbage printed as the computer clears the remaining data in it's buffer, but you should now be able to ensure the printer is online before starting the print again.

Q Mr T. Bauer from Glasgow would like to know why his Archimedes A3000 displays barely comprehensible graphics while trying to run PC software under the *PC Emulator*.

A **Firstly, you need to check which version of the *PC Emulator* you have. There are three versions currently available; the original non-Wimp version and two new Wimp-based versions – one for 1Mb machines and the other for 2Mb or greater machines.**

The former two will only support CGA graphics,



The PC Emulator: how do you sort out the display problems?

whereas the latter will display CGA, EGA or 99 percent VGA graphics (see the configuration menu for default). Having checked to see which type of graphics you are using, you should examine your PC software to see if it has a graphics configuration program accompanying it.

Run this and select a graphics mode to match that used by your *PC Emulator*. If in any doubt, start with a basic one and if that works, you can always move up by experimentation.

Q Mr J Coles of Rickmansworth is studying Greek and would like to know if is possible to print Greek characters using an A3000 running *Pipedream*, equipped with a Panasonic KXP1124 printer. He has managed to obtain the required characters on screen but unfortunately they don't appear on paper when he tries to print them out.

A **There are two possible solutions here. Either using the *Pipedream* drivers or by using the standard Risc OS printer driver, *PrinterDM*. The former will only work if your printer is capable of displaying Greek characters, which your printer manual will tell you.**

If it can, you can edit *Pipedream*'s printer driver by loading it into *Edit* and comparing the character translation table at the end, with those values given in the printer manual.

If you decide to use Risc OS printer driver, then you will need to install some fonts first, by double-clicking on the *Fonts* directory and then telling *Pipedream* to use the Risc OS driver, from the CTRL PD menu.

By using the Risc OS driver, any characters on screen will be sent to the printer to be printed.

HANDY TIP

Andrew Blythe from Droitwich has sent in a handy tip, solving April's problem which Mr Ellis was experiencing with slow output when printing from *Pipedream* to a printer driver.

Andrew suggests selecting the print to file option from the printer driver before printing the document from *Pipedream*. This saves the data to disc much quicker then printing it on paper.

You can then set the printer back to parallel and drag the printer file just produced onto the printer driver icon. This will then print the file as a background task so that you can still use the computer while the lengthy task of actually printing is carried out.

Q Mr A. Green from Wigan asks if he can load BBC Master ADFS discs by using an external 5.25in drive plugged into his Archimedes A3000 and Watford external disc interface.

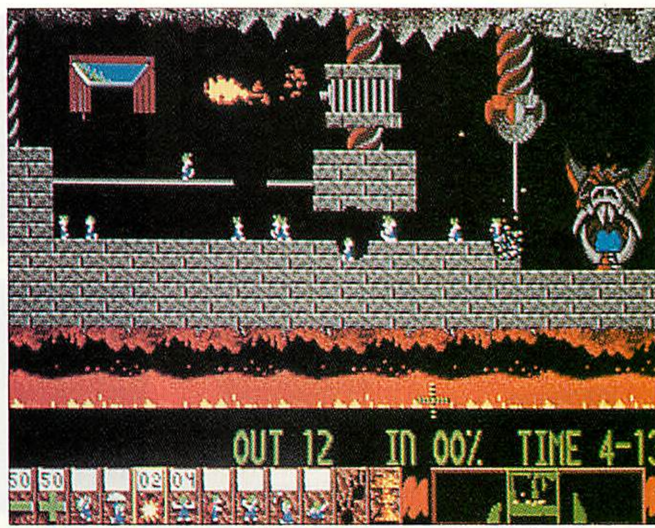
He also asks what will happen to the drive numbers when using this setup.

A **If you plug an external drive in via an interface, configure an extra drive by typing *CONFIGURE FLOPPIES 2 followed by return and then perform a CTRL-BREAK to initialise them. You can then click on the second drive icon to access the external drive in exactly the same fashion as the internal drive.**

If you ensure that any switchable drives are set to 80 track, you can then access BBC Master ADFS format discs with no additional hardware or software. However, remember that Master discs are in Archimedes L format and thus only hold 640K of data. If you try copying a standard Archimedes disc onto one, you may get a disc full message. You should also be able to access MS-Dos 5.25in discs via the PC Emulator.

Q James Pattinson, aged 11, of Sevenoaks is a *Lemmings* fan and having played the five level demo on the free games disc (*BAU* November 91) he is thinking of upgrading to the full 128 level game.

He would like to know if the passwords to select each new level are the same as his friend's Amiga version.



Lemmings:128 levels of pure mayhem, but do you want to cheat?

A **Unfortunately, the passwords on the Archimedes version are different to other versions, so you can't cheat that way. However, the passwords are fairly readily available from public domain libraries and bulletin boards.**

But do you really want to cheat? Surely you will feel much better completing the game knowing it was all your own effort!

Q Mr Newcombe of Cheshire has extended his range of Archimedes fonts by reading the article in *BAU* March 1992.

However, he has two queries; he asks how to obtain a new icon for any additional font directories on his hard disc. Secondly, he reports that *FontFX* has trouble recognising the new fonts.

A **To obtain the correct icons for second and subsequent font directories, copy the file called *!Sprites* from the original font directory into each of the new directories. Load each one into *Paint* and rename the sprites so that they match the name of the directory. If your new font directory is called *!Newfonts*, rename the sprite to *!Newfonts* and then resave the sprite file. Next time you catalogue the disc, the icons should be correctly displayed. You shoud also do this to the *sm!Font* sprites, which is displayed in Full Info or Small Icons windows.**

The second problem seems to lie in your version of *FontFX*. Try contacting The Data Store on 081-460 8991, as versions later than 1.50 work correctly with multiple font directories.

HELP US TO HELP YOU

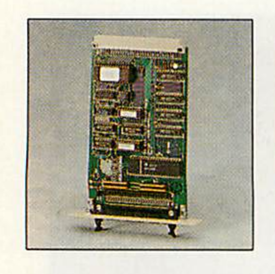
The Questions and Answers page is your chance to have your problems solved. They can be on any topic – you name it and we'll try to solve it. Please send your questions, whether technical or otherwise, to:

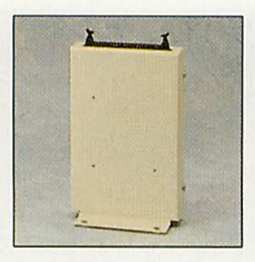
Questions and Answers
BBC Acorn User
20-26 Brunswick Place
London, N1 6DJ.

We are happy to answer your queries on these pages, but regret that we are unable to send personal replies to questions sent in. If you send a disc, please put your name and address on the disc itself. It is also useful if you could include full details of your machine. Please enclose an SAE where necessary and mark on your envelope whether you use a BBC eight-bit micro or 32-bit BBC A3000, Archimedes or A5000.



If it's got to work...











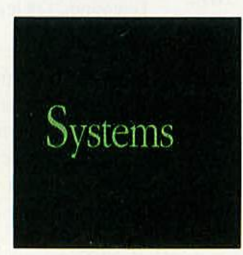








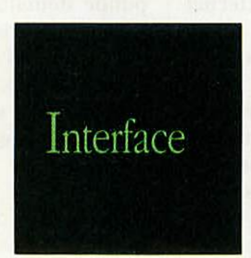




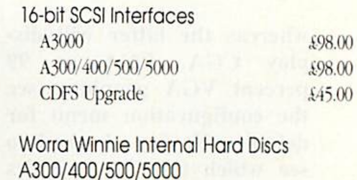










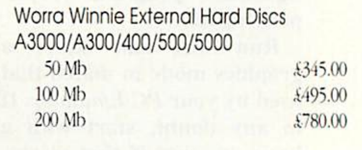


16-bit SCSI Interfaces

A3000	£98.00
A300/400/500/5000	£98.00
CDFS Upgrade	£45.00

Worra Winnie Internal Hard Discs A300/400/500/5000

50 Mb	£299.00
100 Mb	£449.00
200 Mb	£735.00



Worra Winnie External Hard Discs A3000/A300/400/500/5000

50 Mb	£345.00
100 Mb	£495.00
200 Mb	£780.00

High Speed Internal Hard Discs A300/400/500/5000

50 Mb	£339.00
100 Mb	£489.00
200 Mb	£775.00



High Speed External Hard Discs A3000/300/400/500/5000

50 Mb	£389.00
100 Mb	£539.00
200 Mb	£825.00

Elite External Hard Discs A3000/300/400/500/5000

50 Mb	£489.00
100 Mb	£639.00
200 Mb	£925.00
300 Mb	£1345.00
680 Mb	£1795.00

Worra Tape Streamer

60 Mb	£595.00
150 Mb	£795.00

High Speed Tape Streamer

60 Mb	£765.00
150 Mb	£895.00

Elite Tape Streamer (DAT)

1 Gb	£1750.00

Magneto Optical R/W Drive

560 Mb	£3650.00

CD ROM Drives

Worra CD	£299.00
High Speed CD	£399.00

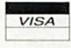
Prices shown include SCSI interface (except CDROMs which require SCSI card and CDFS upgrade).
Always state computer type when ordering

...it's got to be one of ours

The new Worra CD ROM drive offers a low cost entry into the world of multimedia with performance comparable to similar drives. The High Speed CD ROM drive offers the highest possible performance and is better able to cope with more demanding applications, such as Acorn 'Replay' sequences, than cheaper drives.

Each hard disc comes complete with the following FREE software:
Genesis, Euclid, Disc Tree, RISC OS Companion, Worra Battle

Prices exclude £10.00 p&p and VAT





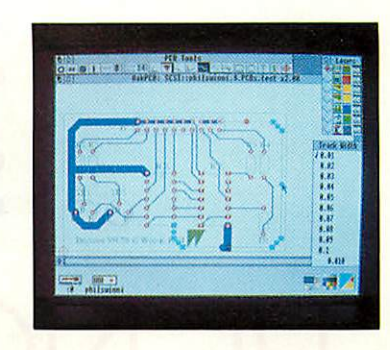
Oak Solutions Ltd. Suite 25 Robin Enterprise Centre
Leeds Road Idle West Riding of Yorkshire BD10 9TE
Tel: 0274 620423 Fax: 0274 620419

Telephone for Education Prices
(and we'll knock off the cost of your call!)

QUALITY RELIABILITY

Oak PCB

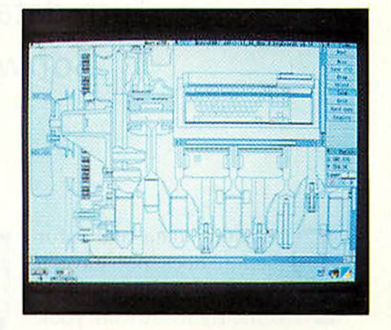
£99.95



Oak PCB is a brand new RISC OS compliant PCB and schematic design package. A multi-tasking desktop user interface based on !Draw ensures that users can quickly exploit the powerful draughting features, and create complex multi-layer circuit boards or schematics. Output is to RISC OS printer drivers, or the plotter driver supplied. Features Drawfile import/export, associative editing, drilling data, solder resist etc. etc. Supplied with comprehensive PCB and Schematic libraries.

WorraCAD

£99.95



WorraCAD is the de-facto standard RISC OS 2D CAD package. Working to 18 significant figures precision, WorraCAD provides all the tools required to produce superb accurate technical drawings. Outputs to plotters and RISC OS printer drivers. Features tangents, normals, intersections, parallels, automatic associative dimensions, grid, Drawfile export, linestyles, 16 layers, hatching, mirroring and stretching, CNC link available to Boxford Lathes. Libraries available seperately.

Draw Print & Plot

£39.95



Draw Print & Plot supercedes our earlier plotter drivers for Drawfiles (WorraPlot and ArcSign - upgrades available). DrawPlot accepts drawfiles and creates output on HPGL compatible plotters. Features outline fonts, sprites, filled areas, line thickness and depth sorting to avoid colours overlapping. DrawPrint accepts drawfiles and allows them to be printed to RISC OS printer drivers at a different scale - for example to create huge posters (cropmarks are created automatically).

KiddiCAD

£69.95



KiddiCAD is an exciting 3D building block package designed for younger users. 3D models may be created, using the library of building bricks supplied, and rotated in real time. The high speed of operation and the live 3D view allows users to quickly gain an understanding of work in 3D. Models may be output as Spritefiles in colour or wireframe mode, and can then be imported into painting packages, DTP, Genesis etc.

Leaders in CAD for the Archimedes

prices exclude P&P (£1.50) and VAT



COMPATIBILITY PERFORMANCE

FREE DISC

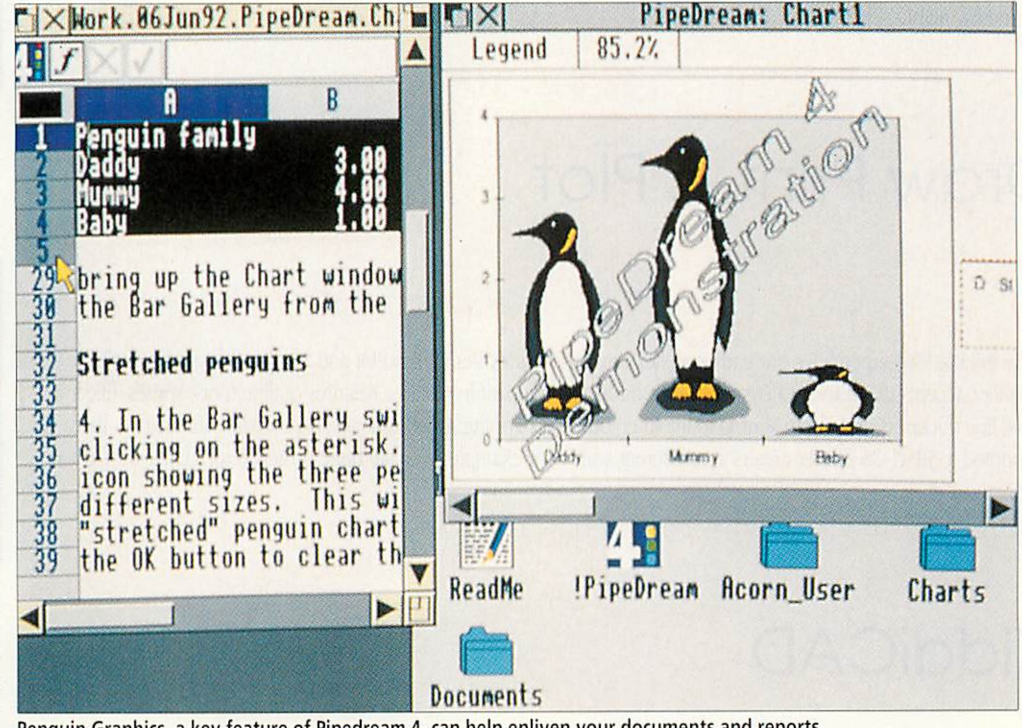
PENGUIN POWER

Turn data into exciting visuals using the demo disc of Colton Software's Pipedream 4, FREE with this month's issue

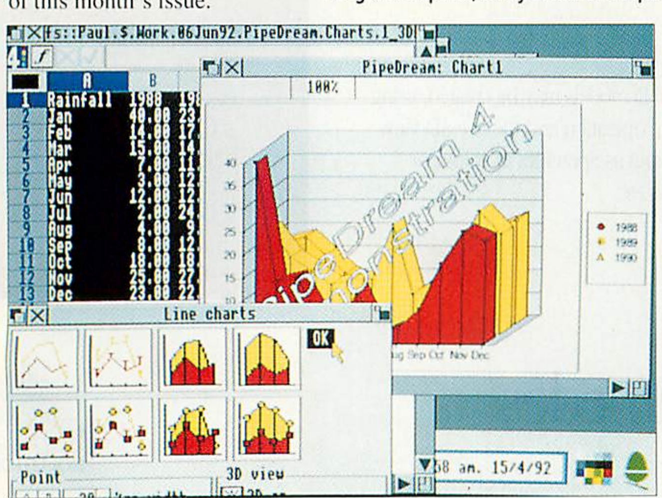
Presenting data and information does not have to be boring – all you need is the right software package to run on your BBC A3000 or Archimedes.

Many Arc users may be familiar with Colton Software's *Pipedream* package – now the company has released version 4 which allows users to turn facts and figures into colourful, high-quality graphical charts.

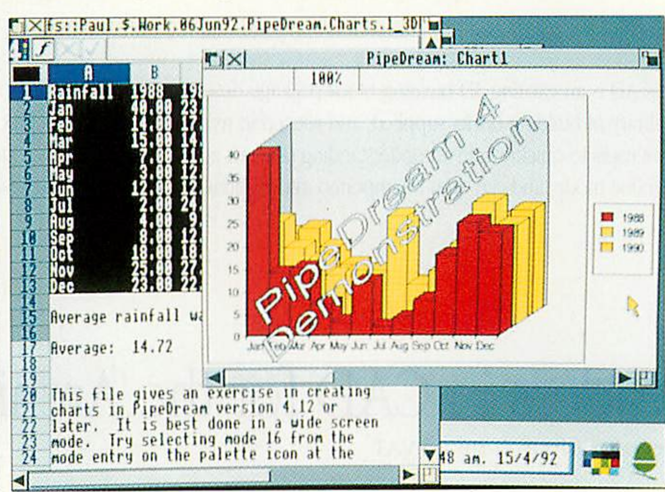
Pipedream 4 is a powerful spreadsheet package with special additional graphics, plus a word processor and fast, compact database. Colton Software calls this package 'the works' – and looking at the facilities it offers, it is not difficult to see why. This month we are giving readers the chance to sample this versatile package by using the FREE demo disc on the cover of this month's issue.



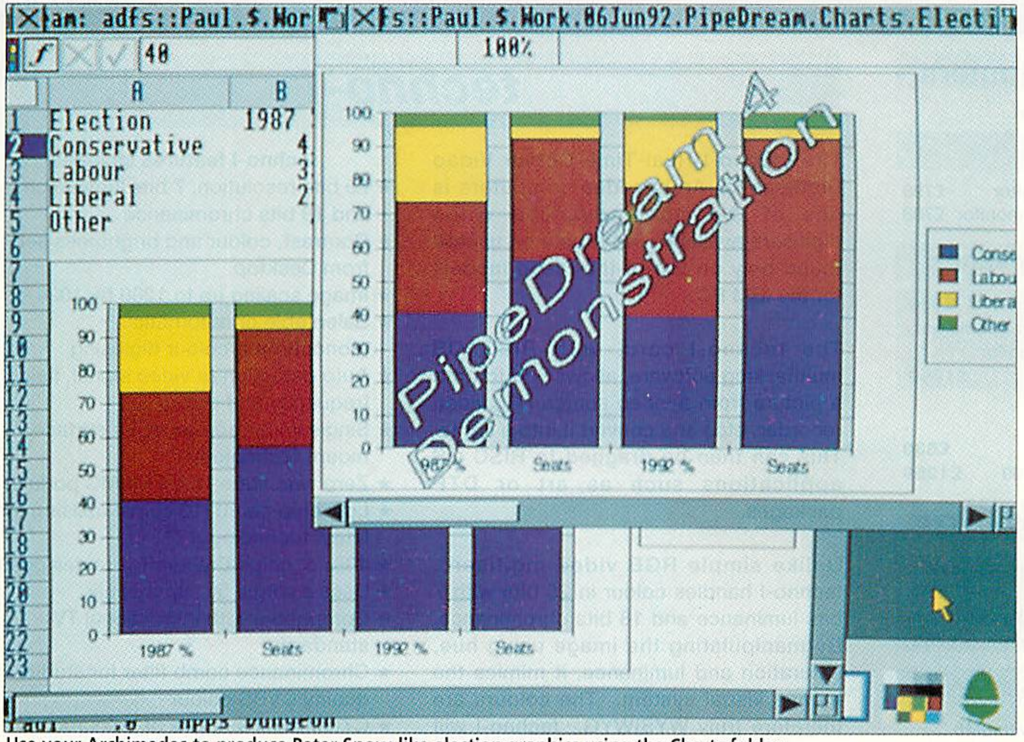
Penguin Graphics, a key feature of Pipedream 4, can help enliven your documents and reports



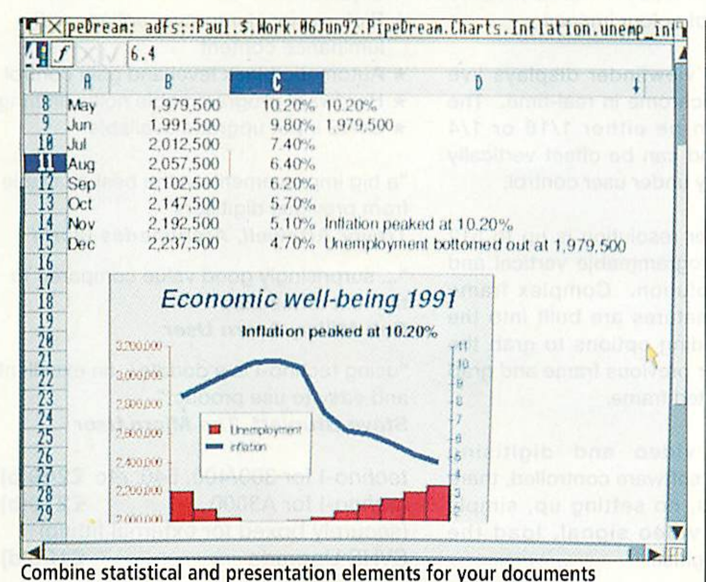
Follow the simple exercises in the Charts folder on the disc...



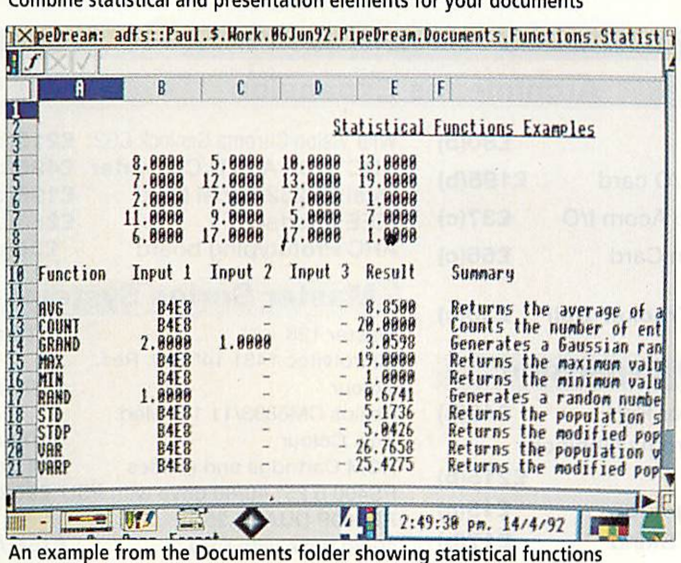
...to create 3D charts in various colours for maximum impact



Use your Archimedes to produce Peter Snow-like election graphics using the Charts folder



Combine statistical and presentation elements for your documents



An example from the Documents folder showing statistical functions

FREE BOOKMARK

Watch out for a free *Pipedream 4* bookmark (shown here), which you can find inside next month's issue of *BBC Acorn User*.

PipeDream 4
...the works
PipeDream 4 Penguin Graphics
daddy mummy baby
Ribbon sales 1988-90
COLTON software
PIPEDREAM 4
Simple Simon Pie sales
PipeDream 4 Pie charts
Isobar chart by PipeDream 4
Colton Software

Not only that, we are inviting readers to produce their own presentations using the *Pipedream 4* demo disc and send them in to us. We will award free subscriptions to *BBC Acorn User* for the best and publish them in a future issue.

The full version of *Pipedream 4* includes a flexible word processor which allows you to use fonts and pictures to create stunning presentations of your letters and reports.

The spreadsheet facility allows background recalculation so you can carry on working while it computes. There are 160 built-in functions, plus a programming language for your own customised operations. There are also arrays within slots for easy manipulation of structured data.

Dynamic charts can be created straight from your data. And personalised Penguin Graphics allow bars to be filled by your own draw files to enliven your data.

The fast and compact database offers full sorting, search and selection facilities and you can link straight to the word processor for printing mailshots and labels.

WHAT'S ON OFFER?

The FREE demo disc allows you to explore some of the many capabilities of *Pipedream 4*. Here is a list of what is included:

- The *Pipedream 4* demo program.
- A Charts folder, including examples of charts, 3D bars, Penguin Graphics, and other examples and pictures.
- A Documents folder, with a variety of document examples and functions. There is also useful advice for users of *Pipedream 3*.

You can only run the *Pipedream 4* demo disc on a BBC A3000, Archimedes or A5000 which has 2Mb of Ram or more. The full version of *Pipedream 4* costs £196 plus VAT (educational discounts and site licences available on request).

For a free brochure on the *Pipedream 4* package, please contact: Colton Software Ltd, 2 Signet Court, Swanns Road, Cambridge CB5 8LA. Tel: (0223) 311881. Meanwhile, enjoy using the demo disc.

ARC vs MAC and PC

The A5000 has earned a reputation as a high quality computer. But how does it compare with the popular PC or the pricey Macintosh? Ian Burley takes three machines and puts them to the test

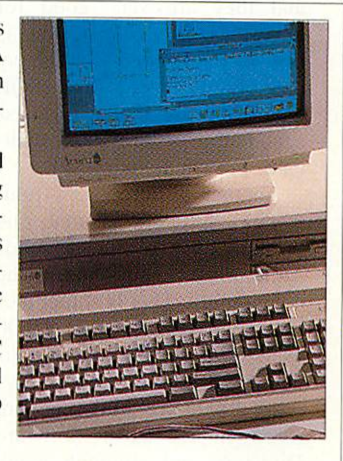
ACORN ARCHIMEDES A5000

- **Memory: 4Mb**
- **Hard drive: 40Mb**
- **Price: £1531 (Learning Curve package)**

Launched last October, the A5000 is the fastest Archimedes yet and features the multitasking operating system, Risc OS 3. Speed-wise, the A5000 compares with a 25MHz 486 PC clone for most functions, although it is slower for floating point arithmetic as it currently lacks a maths co-processor chip. But as all Archimedes enjoy colour graphics, animation and graphical user interface, operations (windows) are noticeably speedier than even the fastest PCs equipped with conventional display hardware.

The A5000 compromises outright number crunching speed and the amount of memory used for bigger screen modes. But the A5000's 13.5 mips (million instructions per second) Arm3 Risc processor means that most display modes – including the super VGA modes like 800x600 pixels in 16 colours – remain impressively fast.

Risc OS is a very advanced second generation operating system and Wimp environment. Its intuitive operation is optimised towards a three-button mouse and many basic Risc OS functions avoid keypresses entirely, unlike PC *Windows*. Risc OS is stored entirely in Rom and takes up little hard disc or Ram space.





APPLE MACINTOSH IIsi

- **Memory: 5Mb**
- **Hard drive: 40Mb**
- **Price: £2500**

This is a cut-down, budget version of the Apple Macintosh II mid-range machine. Even so, a basic Mac IIsi system is almost double the price of either the A5000 or 486 PC. We could have selected the new Mac LCII in this comparison, which is closer in cost to the other two systems, but the performance of the LCII is in the league of much cheaper 386SX or BBC A3000 systems. Even so the Mac IIsi doesn't really compare with either the A5000 or the 486 PC without some pricey add-ons.

Apple pioneered GUIs with the first Macs over eight years ago. The slick Mac front end is much admired, though some might say it is beginning to show its age. The latest release of the operating system, the multi-tasking System 7, has had a mixed reception and has been criticised for being less stable than it should be.

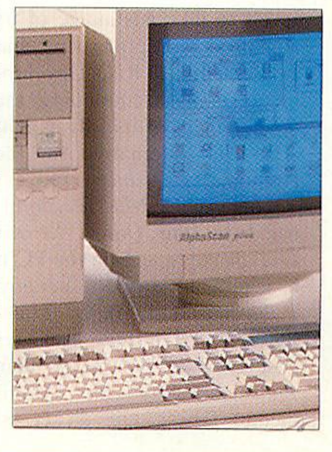
The Mac IIsi uses Apple's 32-bit NuBus architecture and performance is generally good, although the Motorola 68030 processor is not as powerful as either the A5000's Arm3 or a a PC's 486 processor. People buy Mac IIs because of their reputation for their graphics and the range of refined software but nonetheless the large price difference is immediately obvious.

486 PC (25MHz)

- **Memory: 4Mb**
- **Hard drive: 40Mb**
- **Price: £1365**

Here we take a typical budget-priced 486 PC clone. Unlike the Apple Mac market, PC prices have benefitted from intense competition. Considering the complexity of a 486 PC, its pricing defies logic. But complexity is not necessarily a good thing. All ISA or AT-level PCs are based on a design first introduced ten years ago. This means that a 32-bit 486 PC is throttled by a 8/16-bit expansion bus and a bodged memory architecture. Many 486 PCs are supplied with Microsoft *Windows*, but users tend to find it slow as standard PC video graphics adaptors cannot operate at full speed compared to the main processor. *Windows 3* has boosted PC software sales tremendously, but it is not the most intuitive or elegant of GUIs and many users avoid it altogether. The trade off is compatibility. Software and hardware add-ons will work on the simplest XT 8086 PC to the latest 486 machines. That compatibility has maintained the PC domination, despite the introduction of other superior computers.

A new 32-bit open PC standard, Extended ISA (EISA) has been introduced to answer many of the PC critics, but another relic, the Microsoft DOS operating system, will be continuing a key area of PC compromise for a while yet.



THE APPLICATIONS

Wordprocessing, spreadsheets, multimedia, graphics, desktop publishing, databases, communications, CAD (computer aided design), education and of course games are all represented on the A5000.

Some areas are stronger than others. I would have no hesitation in recommending an A5000 for desktop publishing, graphics, education or comms, for example. Although there are packages for database users and small business accounts and they are very good for what they offer, the A5000 is not recommended for heavy duty applications, like SQL databases and major business accounting systems, and dedicated project planning aids.

Another criticism of Archimedes' software is that one example of each category tends to dominate and squash the competition. This is sometimes true, although whether A5000 users have seriously suffered is debatable. Acorn now says over 2000 Arc programs are listed in its latest Software Directory and although many of these are educational programs, there are several hundred general programs. Typical users should find that almost everything they require is available for the Archimedes.

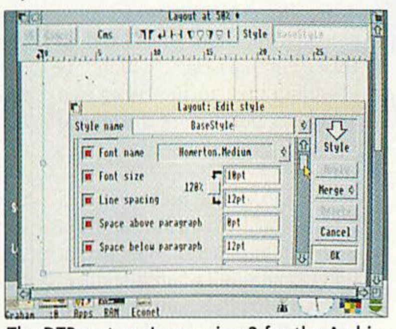


DESKTOP PUBLISHING

With Desktop Publishing, Computer Concepts' *Impression 2* package has emerged as a dominant force. Capable of producing material to the highest professional standards (this magazine is produced using the package) it is priced to allow Archimedes users at all levels to take advantage of its advanced wordprocessing and DTP facilities. Risc Developments is also continuing the development of its less expensive DTP alternative for the Archimedes, *Ovation*.

The Apple Mac is dominated by the *Quark XPress* DTP package and on the PC it is a toss up between *Ventura Publisher* and *Aldus Pagemaker 4*. All of these packages cost considerably more than *Impression* for the Archimedes. There are plenty of budget-priced DTP packages for PC and Mac users, but with a few notable exceptions, there is the risk of getting what you pay for. It could be argued that *Impression* is budget priced, yet it offers both premium-priced support and functionality.

As an example, an system based on an Archimedes might be made up of an A5000, 4Mb Ram, a 120Mb drive, a hand scanner and laser printer. If you decided to plump for a Computer Concepts' LaserDirect Hires4 printer, *Impression 2* and a Watford 400dpi hand scanner, you would have to budget for around £2800 plus VAT. A similar set up for a 486 PC system based around, say, *Ventura Publisher Gold* or *Pagemaker 4*, plus a low-cost PostScript printer (Star LP4PS) and a Logitech 256 hand scanner would cost about the same as the Archimedes system. However the Arc's Risc OS-dedicated LaserDirect printer would be a great deal faster and operate at a higher printing resolution and the Watford scanner would have a far better range of image processing functions. *Impression 2* is less than half the price of *PageMaker 4* or *Ventura Publisher*, but neither can match the sheer graphics rendering speed of *Impression*. To get a faster printer and better image processing software for the PC you could end up spending over a £1000 more.



The DTP system, Impression 2 for the Archimedes offers exceptional value for money

Meanwhile the Macintosh is on home territory when it comes to DTP, but the kind of money you would need to spend on a system to match the Archimedes is in another league altogether – and that is without optional accessories, such as graphics accelerators to bring graphics rendering speed up to Archimedes' levels. You would have to almost double your Archimedes or PC budget to buy a comparable Macintosh setup.

BUSINESS

For business applications ranging from spreadsheets to full-blown accounts packages, there are some good options the various platforms. For the Archimedes, there is Colton Software's *Pipedream 4* spreadsheet cum wordprocessor cum database (see the demo disc on this month's cover) as well as *Schema* from Clares. Both packages are useful, satisfying many thousands of users in everyday applications. And watch out for *Eureka* from Longman Logotron to be released later this year.

If an all-singing, all-dancing spreadsheet package is required, featuring SQL, (structured query language) database accessibility and multi-dimensional modelling, then *Lotus 1-2-3* or *Microsoft Excel* on a PC or Informix *Wingz* on the Apple Mac are the favoured choices. But *Pipedream* or *Schema* on the Archimedes is more than adequate for most people's needs and at a third of the cost. There are several Archimedes databases around such as *Squirrel* from Digital Services, and *System Delta*, *Flexifile* and *Multistore* from Minerva. All cost below £200 and again they will satisfy most personal and small business user needs.

Pipedream on the Archimedes serves as a spreadsheet, wordprocessor and database

If you do need a flexible system to run a large business on, it is hard to argue against the pricier option of a *dBase* compatible system on the PC. And there are many, such as Ashton Tate's *dBase IV*, Fox Software's *FoxPro* and Borland's *Paradox*. On the Mac, there is *FileMaker Pro* from Claris, *My Advanced Database* (MacWarehouse) and the powerful *Omnis 5* from Blyth.

GRAPHICS

One category where the options abound is graphics. Very capable painting, drawing and presentation programs are available for the Archimedes. Just a few of these include Ace Computing's *Euclid* (3D drawing and animation); Longman Logotron's *Revelation 2* image processing package; *Atelier*, the painting and animation package from Minerva and of course *ArtWorks*, the new object-orientated drawing package from Computer Concepts. Also all Archimedes have serious paint, object drawing and text editing facilities provided free as part of Risc OS.


Artworks, a drawing package for the Archimedes, gives excellent vector graphics

The Archimedes is currently limited to 256 colours from a palette of 4096. PCs and Macs are easily upgraded (at a cost) to 24-bit display configurations offering up to 16.7 million colours. But that does not exclude 24-bit images from the Archimedes as Acorn has developed a special utility, called *ChangeFSI*, which translates high-res colour images into formats compatible with the standard display. Extensive use of pixel colour dithering enables colour images of startling quality to be displayed on ordinary TV.

Once again the Mac is on home territory with graphics. Packages like *ColorStudio* and *Photoshop* are unrivalled for photographic level image manipulation and processing in full colour – at almost £1000 each! There is also the more affordable *MacDraw*, *Aldus SuperPaint* and *Aldus Digital Darkroom*. The Mac is hard to beat, but only if money is no object.

There is plenty of choice on the PC, but there are also display limitations imposed by the hardware. *Corel Draw* is almost a legend these days but has competition from the new *MicroGrafx Draw* and *Aldus Freehand* to name a few. The *Ventura Publisher* system now offers a *PhotoShop* level image processing package.

Multimedia has become a big issue recently and Apple have just released a new multimedia video windows system, *QuickTime*. At the same time, Acorn released *Replay*, a windowed video replay system which is said to out perform *QuickTime* in several ways (see our comparison next month). The multimedia PC standard (MPC) is based around an extended derision of the *Windows* GUI but it still suffers from the PC hardware and graphics compromise.

PRINTING

Today we place great demands on the printing abilities of a personal computer system. Speed and flexibility are of the essence. It is certainly not just a case of choosing the right printer. Factors like operating systems, font management and printer standards all need scrutiny. How do the protagonists shape up?

Printing is the Archimedes' trump card – it has arguably the best font management system and fastest printing solutions of any comparable system below £5000. The very sophisticated text font manager of Risc OS can produce a virtually infinite range of displayed or printed text sizes using scalable outline fonts. Neither Macs nor PCs get this as standard and even with comparable options, neither offer the further Risc OS feature of anti-aliased fonts which retain on-screen readability and smoothness of displayed text to tiny sizes.

Coupled to that is the fact that the same font manager handles displayed and printed fonts so what you see on screen will be the closest possible representation of what gets printed. Hardware developments also mean the A5000 can offer the fastest laser printing around – and at up to 600 dpi (dots per inch) resolution.

So how do the PC and Mac compare? Well, the sheer ubiquity of the 486 PC means that it can be connected to all manner of printer hardware. But lack of standardisation can be a problem. As the Dos operating system manages printer output, applications which offer printing must re-invent the wheel and provide their own printer support. Some applications are very good, some less so.

Then there is a whole army of competing font systems, including Adobe Type, Bitstream, Typografica and Manager. The cheaper ones only offer pre-set font sizes, and printer font matching can be a problem. A properly set up PC is capable of printed results as good as any other, but getting your PC set up properly in the first place is not always a simple task.

With the Mac, on the other hand, there are less printer standards to juggle, as Apple has dictated the trends. At the budget end, Apple offers conventional dot matrix and ink or bubble-jet printer support. Apple actually badge-engineers Canon's excellent bubble-jet printers. At the higher end, Apple standardises on PostScript.

PostScript printers are more expensive than less complex HP LaserJet compatibles, but prices have dropped recently and respectable PostScript laser printers can now cost less than a grand. PostScript is fast for printing fonts, but can be slowed up by bit-image graphics and this an area where the advantage held by the Archimedes LaserDirect is clearly maintained.

EXPANSION

There is no shortage of hardware upgrades for any of the systems we are comparing here. All offer upgrades like Midi interfaces, laboratory equipment control interfaces, Ethernet networking interfaces, SCSI (small computer system interface standard) for extra hard discs, image scanners and CD Rom drives. The Archimedes offers specialised 'podule' expansion modules, up to four of which can be plugged internally in an A5000. Video enthusiasts have a selection of genlocking cards and digitising add-ons.

There is a lot of very exotic hardware available for PCs and Macs, although much of this seems to be the product of a struggle to counter deficiencies in the basic machines. Mac users are faced by a bewildering array of graphics accelerator cards, a couple of which (from Radius Technology) even use the same Arm Risc processor technology used in the Arc.

Cards to accommodate ever bigger and higher resolution monitors are common for PCs and Macs and a number of these are under development for the Arc.

Considering its relatively small user-base, the Arc has an impressive selection of hardware add-ons, several of them highly innovative. This is probably thanks to the appeal of the Arc to skilled enthusiasts who are experts in electronics engineering.

WHAT YOU GET

	A5000 (Learning Curve)	486PC (Model 5/40)	MACINTOSH IIsi
Processor	25MHz ARM3	25MHz 486	20MHz 68030
Memory	4Mb	4Mb	5Mb
Hard drive	40Mb	40Mb	40Mb
Floppy drive	1.6Mb	1.44Mb	1.44Mb
Operating system	M/tasking Risc OS 3	S/tasking Dos 5	M/tasking System 7
Screen	14in multisync 800x600 16 colours 640x512 256 colours 1152x896 monochrome	512K SVGA 1024x768 16 colours 800x600256 colours	13in hi-res 640x480 256 colours
Sound	8 stereo voices	Single channel beep	Sampled beep
Bundled software	PC Emulator, Genesis 1st Word+ WP, Multimedia, Maestro Draw, Paint, Edit BBC Basic V + More	Paint, GW Basic	Various utilities
Price	£1531	£136	£2500

The prices quoted are competitive deals and well below suggested retail pricing. (The PC price was quoted by Watford Electronics.) It's no surprise that a PC works out slightly cheaper than an equivalent Arc, on the other hand the Mac is alot dearer – even though its relative performance is less than the Arc or the PC. Bear in mind that for this price, the Arc has three applications built in: *Draw*, an object oriented drawing program: *Paint*, a paint program; and *Edit*, a text editor. Also included in the Acorn Learning Curve package is the *Acorn PC Emulator*, *Genesis* multimedia package, *1st Word Plus* word-processor and *Acorn DTP* desktop publishing software. For a working system, complete with software and hardware peripherals, the inherent design advantages of the Arc really begin to show their mettle as shown in our DTP section on page 28.



CONCLUSION

Let's make it perfectly clear – all of the systems we have looked at here offer serious and desirable solutions to specific tasks and warrant consideration for the right purpose and situation. If your budget is unlimited, it may be difficult to resist the Apple Macintosh – you may pay twice the price of the equivalent PC or Archimedes solution, but with the right investment the Mac can do most things extremely well.

But if you cannot justify the cash, the Macintosh is seriously flawed. Do you settle for a lesser Mac model and end up with a relatively easy to use, but slow, computer which might be expensive to maintain and expand?

The PC option is more clear cut – a safe but unambitious bet. PCs dominate the market and are therefore cheaper, more easily expandable and there is plenty of software. But there are questions over the Windows/Dos compromise – software can be expensive, buying a cut-price PC clone needs to be done carefully and ease of use is not a PC advantage.

And so to the A5000. The software selection is often far less expensive, although not as wide as that for a Macintosh or PC. However, the A5000 can run PC software using the *PC Emulator* and packages are available to utilise Macintosh files.

If you step back from any prejudices and view the A5000 platform on its merits, you will find it difficult to match the superior graphics performance, the no-compromise and easy to use operating system and desktop graphics environment, the fastest and highest resolution printing solutions around and several outstanding software applications which marry all these exclusive features together.

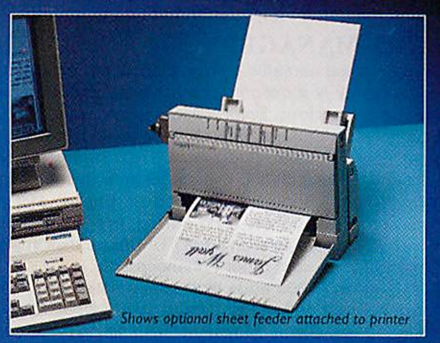
THE DRIVING FORCE



Winner of the Best Printer in the recent Computer Shopper Awards, the Cannon BJ10ex printer has revolutionised the small printer market. It offers 360 dpi, near laser printer quality, on plain A4 paper, in an incredibly compact and lightweight housing. Unfortunately the existing RISC OS printer drivers, based on the standard Acorn drivers, have definitely been in the slow lane, locking your computer up for the entire print process, often up to ten minutes per page.

Computer Concepts have now created a set of RISC OS printer drivers, called TurboDrivers, that are optimised for the Cannon BJ10ex printer. The result is the perfect combination of budget printer and RISC OS printer driver, able to print full 360 dpi high resolution pages at a quality superior to that available from any dot matrix printer.

The TurboDrivers not only print the pages faster, but give control back sooner - up to ten times quicker. The table shows the time taken to print and the time the computer is occupied for some typical example pages.


Shows optional sheet feeder attached to printer

The TurboDrivers print faster on an ARM2 machine than traditional drivers on an ARM3 machine. In addition they can send the print data to disc and then print from disc in the background, so the computer and almost all memory remains free for other uses, while the printer gets on with printing.

	Standard Driver	TurboDriver	
	Time to complete	Time to complete	Time to get control back
A complex page of text & graphics	521 seconds	199 seconds	70 seconds
2 pages text in different fonts	753 seconds	283 seconds	64 seconds
One complex page from !Draw	643 seconds	261 seconds	187 seconds

All times in seconds from a standard ARM2 Archimedes with 4MBytes RAM and hard disc. Times would be faster for an ARM3 based machine.



BJ10ex printer & drivers £249.00 + VAT (£292.57) + p&p. Optional 30 sheet feeder £48.00 + VAT (£56.40)
TurboDriver software & printer cable £49.00 + VAT (£57.57)

Compatible with all applications that use the RISC OS printer drivers and all Archimedes models.



Gaddesden Place Hemel Hempstead Herts HP2 6EX 0442 63933

Weather Data

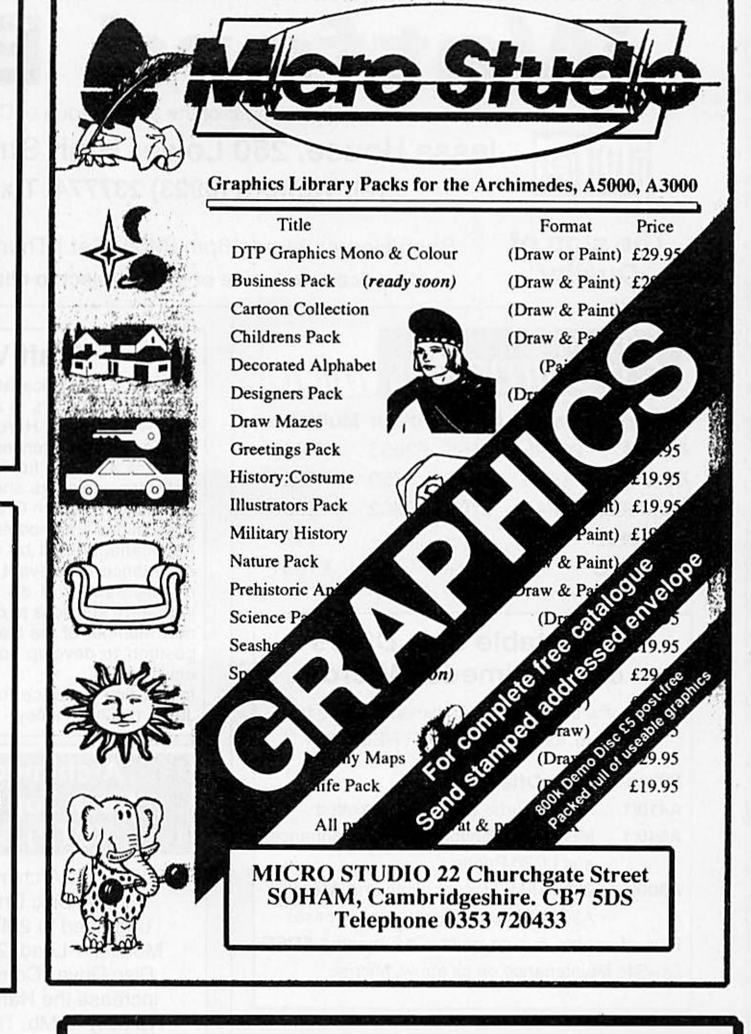
Weather Satellite Systems Now available for the Acorn Archimedes A310 and A3000. This Meteosat systems comes complete including everything from the Antenna to the software. Animation is standard allowing the dynamic progress of weather fronts to be monitored and tracked. High resolution images of 800 pixels by 800 lines can be stored and manipulated in colour or grey scales on any standard colour monitor. Acorn Change FSI registered and compatible. Capable of receiving up to 400 images every day this remarkable system costs just £799.00

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For Low Cost, High Performance Archimedes IDE Hard Disc Drives, please turn to page 13

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A3000 I/O Card (User, Analogue & IIC)

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

The card is provided with an extensive manual explaining installation, all software commands, connector pin outs, hardware addresses and example programs.

Features
- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices.

£42

Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

Silicon Vision

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Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

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- A300/A3000 £21
- A400 £25

More Archimedes Products
See Pages 3, 5, 6, 8, 10, 13

LANGUAGES (Archimedes)

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Assembler; LISP; Prolog X			£149 each
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256 Grey-Scale Scanner

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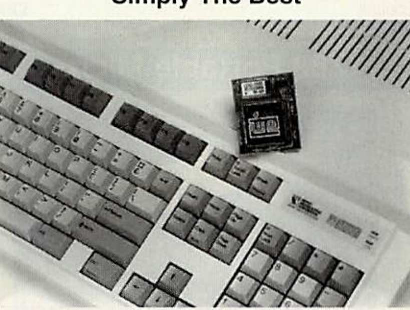
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Offer Price £169

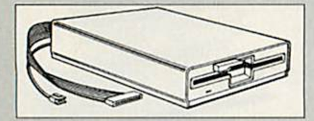
Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

Continued→ → → → → → → → → →

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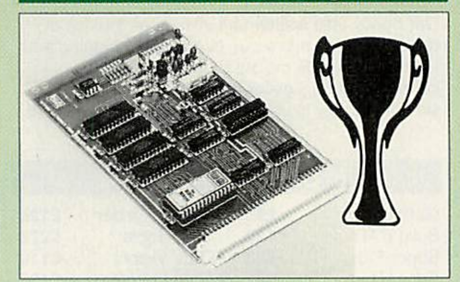
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Archi Real-Time Digitiser



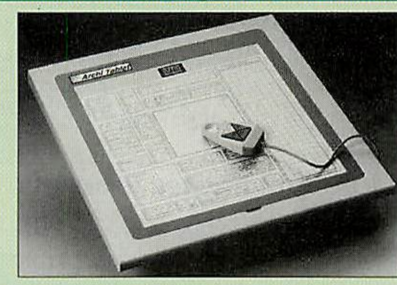
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(The single Density DFS system is now old technology. Like Acorn, Watford too have replaced it with their more up-to-date 1772 DDFS Interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

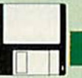
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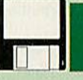
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• ***M2** 3" Double Sided*	*£2.50 each*

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Various UK "manufacturers" of disc drives for the BBC Micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

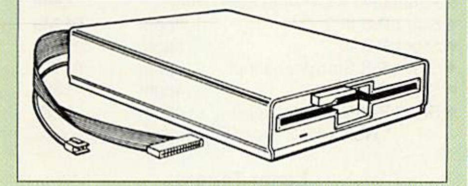
If you look around the popular BBC Micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

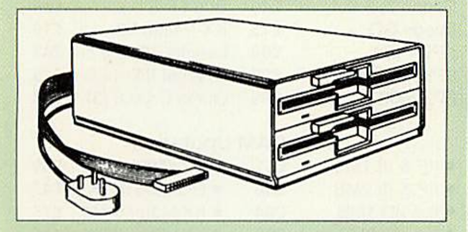
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double Plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£70**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£138**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£80**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£153**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

3.5" Disc Drive

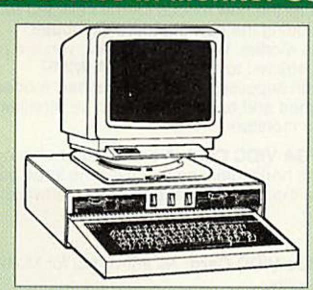


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£59**
• **CLD35:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£82**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drives in Monitor Stand



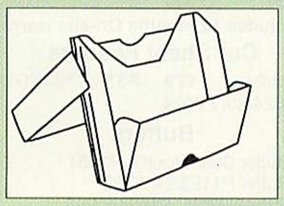
• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

Plastic Library Cases



DLC1 –	Holds 5 x 3.5" Discs.	**£1.50**
DLC2 –	Holds 10 x 3.5" Discs.	**£1.90**
DLC3 –	Holds 5 x 5.25" Discs.	**£1.60**
DLC4 –	Holds 10 x 5.25" Discs.	**£2.00**

Disc Albums

Attractively finished in leather-look PVC Vinyl

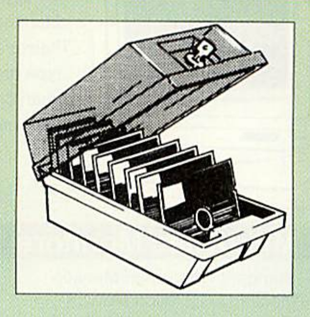
DW1 –	Holds 6 x 3.5" Discs	**£2.50**
DW2 –	Holds 6 x 5.25" Discs	**£3.00**
DW3 –	Holds 20 x 5.25" Discs	**£3.50**
DW4 –	Holds 40 x 3.5" Discs or 5.25" Discs	**£4.50**

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units



Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

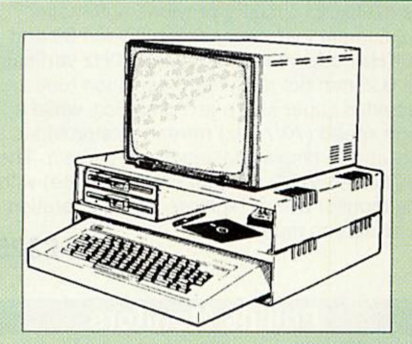
- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M100** – holds 100 3.5" discs **£6.99**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

Plinths for the BBC B, BBC Master & A3000



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

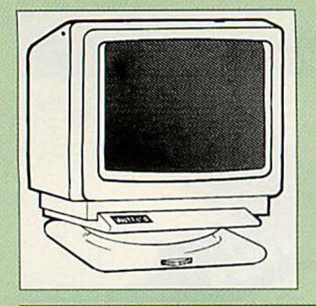
Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

A3000 Single Plinth (very sturdy & precision made), has a slot on the left for the switch & cut out on the right for 3.5" Disc Drive **£13**



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Continued→ → → → → → → → → →



FREE Monitor lead. Please specify type required when ordering your monitor.

Microvitec Monitors

- **1431** – Standard Resolution Monitor £169
- **1451** – Medium Resolution Monitor £209
- **Cub3000** Medium Res for A3000 £189
- **1441** – High Resolution Monitor £359
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

Eizo 9060S	£389	NEC 6FG	£1525
Eizo 9070S	£579	Taxan 770LR	£362
NEC 3FG	£370	Taxan 775	£362
NEC 4FG	£465	Taxan 795	£397
NEC 5FG	£850	Taxan 875	£685

- VIDC Enhancer Board £25

(We will supply the Watford's superior Multiscan VIDC Enhancer for Archimedes micro at only £10, if purchased with any Eizo or Taxan monitor.)
(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Aries AlphaScan Monitor

Pound for Pound, the AlphaScan VGA Multiscan monitor provides the maximum performance and greatest flexlbility of any 14" colour monitor for the Archimedes micro.

Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The Multivideo VIDC Adaptor supplied (free) with the monitor allows high resolution operation in all screen modes.

£325

Philips Monitors

- **BM7502** 12" Hi-res Green Monitor £67
- **CM8833** 14" Med. Res Colour Monitor £167
- Dust Cover for Philips Monitors £6

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £166

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Concept Keyboards

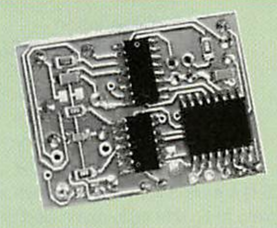
Standard A3 Keyboard with BBC Software	£138
Standard A4 Keyboard with BBC Software	£109
Archi A3 Keyboard	£139
Archi A4 Keyboard	£110

Aries 2000 Colour Monitor

This attractively finished, etched screen medium res monitor is supplied complete with built-in speaker, volume control and video output. All controls are located on the front panel for ease of use. Ideal for BBC, BBC Master, Archimedes and Amiga.

A bargain at £159

VIDC Enhancer

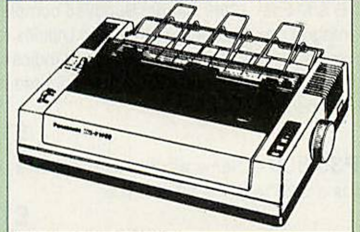


This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A WIMP application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

Super VGA VIDC Card: A unique electronic design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control **£45**

MultiVideo VIDC Card: As above but for MultiScan monitors only. **£25**

Panasonic Printers



KX-P1123	£129	KX-P1695	£272
KX-P1124i	£173	KX-P2624	*£295
KX-P1170	£100	KX-P2180	£165
KX-P1624	£272	KX-P2123	£219
KX-P1654	*£335		

*** Price includes 12 months On-site warranty**

Cut Sheet Feeders

P36 – 1124/24i £79 **P37** – 1123/70/80 £69
P38 – P1624/95; P2624 £129

Buffers

P12 4K Buffer Board for KX-P1081 £55
P14 32K Buffer P1123/24/70/80 P1540/92/95; P1624/54/95 £16

Serial Interfaces

P19 for P1123/24/24i/70/80/1624/54/95/2624 £49

Citizen Printers

120D Plus	£100	Swift 9	£134
124D	£145	Swift 24E#	£234
224	£185	Swift 24X	£299
PN-48	£209	PN48 Ribbon	£4

\# FREE Colour Option with Swift 24E

- Swift 9 Colour Option £19
- Swift 24 Colour Option £29
- Swift 24 Ribbons Black £4 Colour £13
- Citizen/Archimedes Colour Printer Driver £15

Integrex Colour Jet

- Colour Jet 132 Printer £449
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £21
- Black Cartridge £12.40
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123
- Colour Jet 2000 £POA

Star Printers

LC15	£173	LC200 Colour	£143
LC20	£100	SJ48 Inkjet	£174
LC24-10	£133	XB24-200 Colour	£295
LC24-15	£240	XB24-250 Colour	£355
LC24-20	£169	XB24 Colour kit	£29
LC24-200	£164	ZA200 Colour	£234
LC24-200 Colour	£203	ZA250	£297

- Star/Archimedes Colour Printer Driver £15

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £52

Buffers

32K Ram Card for LC/XB24-10; 15; LC200 £55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

All Laser Printers include 12 months On-site maintenance

Brother HL-4	4ppm	£594
Brother HL4-V	4ppm	£694
Brother HL4-PS Postscript	4ppm	£1079
Brother HL8-V	8ppm	£1044
Canon LBP-4+	4ppm	£575
Canon LBP-8 III	8ppm	£970
Canon LBP-8III Plus	8ppm	£965
Epson EPL4100	6ppm	£550
Epson EPL7500	6ppm	£1150
Epson EPL8100	10ppm	£965
HP Laserjet IIP+	4ppm	£625
HP Laserjet III	8ppm	£1015
HP Laserjet IIID	8ppm	£1499
HP Laserjet IIIP	4ppm	£705
HP Laserjet IIIsi	16ppm	£2525
Panasonic KX-P4420	8ppm*	£620
Panasonic KX-P4450i*	11ppm*	£925
Panasonic KX-4455 Postscript	11ppm*	£1450
Panasonic KX-P4430 Satin Print*		£999
Star LP-8 III 2	8ppm	£1249
Star LP-8 III	8ppm	£910
Star LP-8 Star(post)script	8ppm	£1140
Star LP-4	4ppm	£565
Star LP-4PS Postscript	4ppm	£779

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	£46	Star LP-8	£56
Epson GQ	£13	KX-P4420/50	£19
EPL 4100	£59	Laserjet HP IIP & IIIP	£42
EPL7100	£82	Laserjet II/D, III/D	£48
EPL7500	£99	Qume Crystal (3)	£58

Laser RAM Upgrades

IIP & III 1MB	£51	EPL7100 256K	£39
IIP & III 2MB	£88	GQ5000 512K	£42
II & IID 1MB	£64	KX4420/50 1M	£75
II & IID 2MB	£99	KX4420/50 2M	£115
II & IID 4MB	£146	KX4420/50 4M	£195
Canon LBP4 1M	£105	Star LP8 1M	£139
Canon LBP8 2M	£125	Star LP8 2M	£275

Laser Drum & Developer

Epson Drum GQ5000	£93	EPL7100	£129
Panasonic 4420 Drum	£60	Developer	£59
Panasonic 4450 Drum	£93	Developer	£80
Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

- HP IIP/III £225 IID & IIID £227

Various Add-Ons

- Laserjet Appletalk Interface £135
- HP Adobe Postscript £399
- Pacific Page Postscript £259
- HP Premier Font Collection £28
- Laserjet various Font cartridges from £45

Hewlett-Packard Printers

- # Desk Jet 500 £285 • Paintjet XL £1045
- Desk Jet 500 Col. £449 • Quiet Jet Plus £384
- Paint Jet Colour £430 • HP Think Jet £265

3 years extended Parts & Labour warranty £49

- DeskJet 500 Cart. Black £15; Colour £27
- Paintjet Cartridges Black £19; Colour £23
- Desk Jet 500 256K RAM cartridge £99
- HP Epson FX Emulation Cartridge for Desk Jet £59
- DJ 500 High Capacity Black Cartridge £21

Plug In Font Cartridges for DJ 500

- 22706B – Prestige, Elite, Line Draw fonts £55
- 22706C Letter Gothic & HP Line Draw fonts £56
- 22707P – Proprint Emulation Cartridge £57
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10EX	£183	£43		£16
BJ300	£289	£88	£65	£12
BJ330	£380	£110	£79	£12
BJC800C £1419				

- Spare Battery pack for BJ10E £33

NEC Pinwriter Printers

- P20 £180 • P70 £419
- P30 £240 • P90 £635
- P60 £325
- P60/70 Colour Option Kit £59
- Ribbons Black for P20/30 £6 for P60/70/90 £7
- Ribbons for P60/70/90 Black £9 Colour £13.50

Cut Sheet Feeders

P20 £59; P30 £85; P60 £89; P70/90 £80

Epson Printers

DFX5000	£1079	LQ1060 Colour	£595
DFX8000	£1960	LQ1070	£313
FX850	£264	LQ1170	£435
FX1050	£336	LQ2550+	£675
LQ100	£159	LX400	£101
LQ200	£162	LX850+	£140
LQ450	£165	LX1050	£206
LQ570	£205	SQ850	£432
LQ860 Colour	£444	SQ2550	£625
LQ870	£362		

Cut Sheet Feeders for

LQ570, LQ870 £47
LX400/850/LQ200/400/450/500/550
LQ1010/1070/1170 £72
LX1050 £115 FX850/LQ860 £128
FX1050/LQ1060/SQ850 £155
LQ2550 £299 SQ2550 £210

Tractor Feed for

LQ800 £44; LQ850/FX850 £69; LQ1050/FX1050 £85; LQ2500 £90; LQ2550 £90.

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces

RS232 £28 RS232 + 2K Buffer £52

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£4
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Plotters

- HP7440AU £525 • HP7475AU £715

Roland Plotters

- DXY1100 £490 • DXY1200 £620
- DXY1300 £825 • DXY2500 £2345
- DXY3500 £2955 • Sketchmate £310
- Roland plotter Pens, Fibre tip £7.50

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 2,000 Sheets 15" x 11" Fanfold Paper £16
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Laser Printer Labels on A4 Sheets

3750 70 x 29mm (3 Rows)	£13.50
3000 70 x 37mm (3 Rows)	£13.25
2625 70 x 42mm (3 Rows)	£13.00

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
DMP4000	£3.75	£4.85
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.00	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£6	

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595 £6
P115 for KX-P1180 £7 **P145** for KX-P1124 £7
P140 for KX-P1540 £8 **P155** for KX-P1624 £8

Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red £9 each

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	Serial	Parallel
• 2 to 1	£10	£11
• 3 to 1	£13	£14
• 4 to 1	£16	£17

Professional Type

Connects	Serial	Parallel
• 2 to 1	£17	£18
• 3 to 1	£22	£25
• 5 to 1	£34	£38

Cables extra at £6 each

2 Way Compact Printer Switch

A handy 2 way printer switch can be attached to the micro or monitor for ease of use.
• Centronics £18; • Serial £17
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Parallel
2 to 1	£40	£45
4 to 1	£62	£49
8 to 1	–	£89

256k Multi Spooler

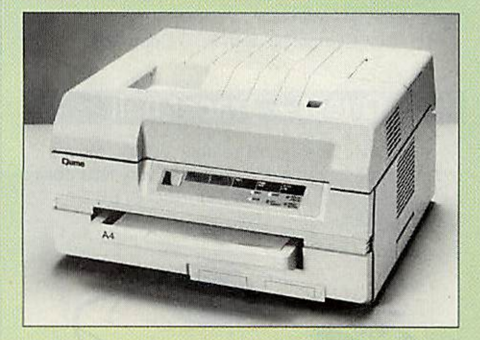
These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out £135 • 4 In/2 out £169
- 8 In/1 out £199

Compact Converter Units

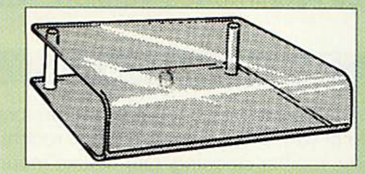
Serial to Parallel £36 Parallel to Serial £37

Laser Direct



- Laser Direct Qume 6ppm complete £749
- Special High Res Card 600 DPI for Canon LPB 4 & LPB 8 Laser Printers £315
- LPB 4 Printer plus High Res Card £875
- LPB 8III Printer plus High Res Card £1275

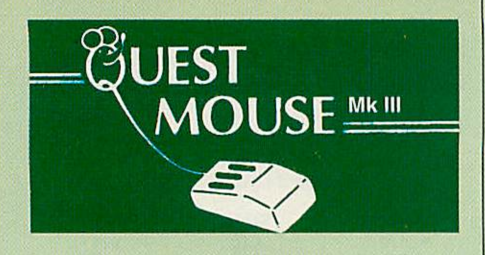
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version £16 (carr £3)
136 Column version £20 (carr £4)

Continued→ → → → → → → → → →



- Quest Mouse III & Quest Paint £59
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse III only £30
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

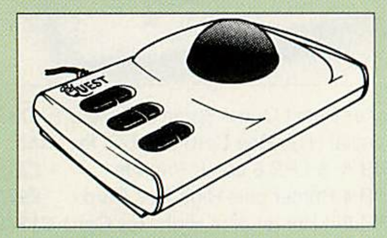


Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£25**
QT-20 Archimedes Version **£26**

Mouse Cleaning Kit

To obtain trouble free operation and prolong the life of your mouse, the high tech rodent requires regular cleaning. Our deluxe mouse cleaning kit is ideal for the purpose £3

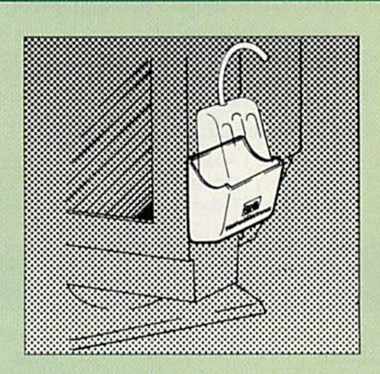
Mk II Light Pen

Ideal for BBC B and Master. Price includes software on disc and operating manual £17

Mk III AMX MOUSE

- **AMX Mouse plus Super Art £54**
  (Please specify for BBC, Master or Compact)
- AMX MOUSE ONLY £29
- AMX SUPERART Package £29
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £25
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £34
- AMX XAM Educational £15
- AMX EXTRA EXTRA £16
- MOUSE MAT £3

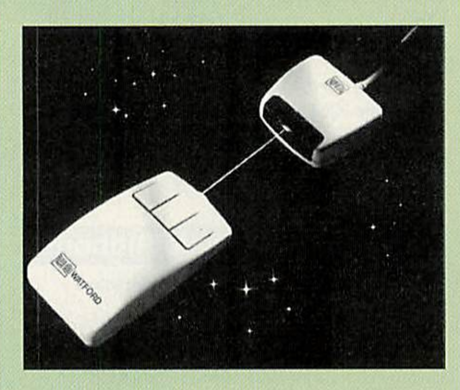
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive etc.

Only £3

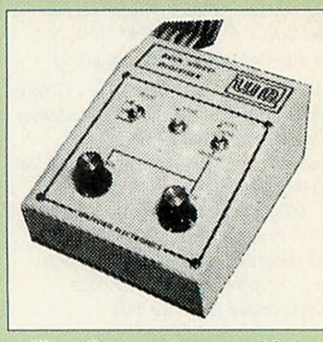
Archi Cordless Mouse



Features
- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £59

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

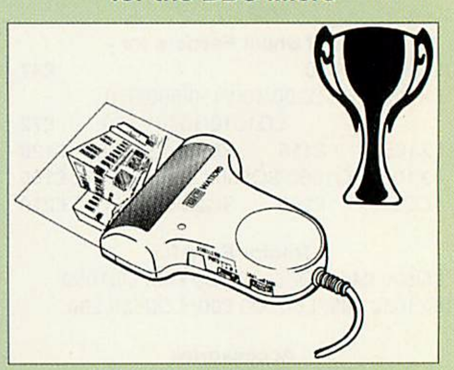
£99

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Beeb Hand Scanner

Hand-held Scanner for the BBC Micro

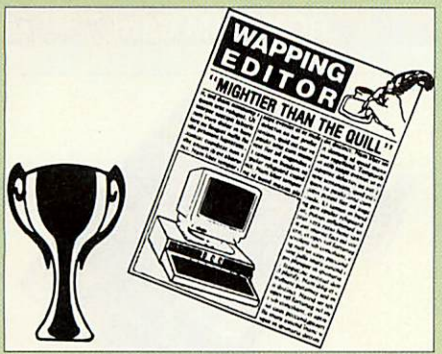


Watford Beeb HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs!

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £99



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£59**
Wapping Editor plus Mouse	**£79**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Archi A4 Scanner



This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

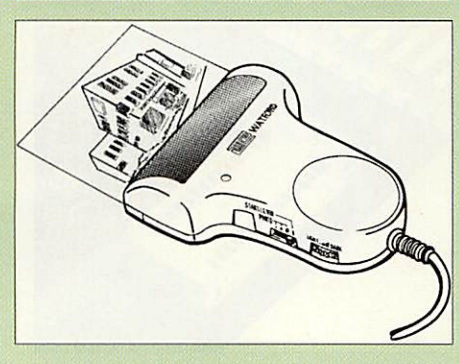
New Low Prices:

Archi A4 Scanner	**£269**
Sheet Feeder for above	**£75**
Scanner + Sheet Feeder	**£359**

Computer Concept Scanlight

• Scan-Light A4	**£275**
• Scan-Light A4 + Sheet Feeder	**£368**
• Scan-Light Junior mono	**£130**
• Scan-Light Junior 256	**£197**

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £119. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

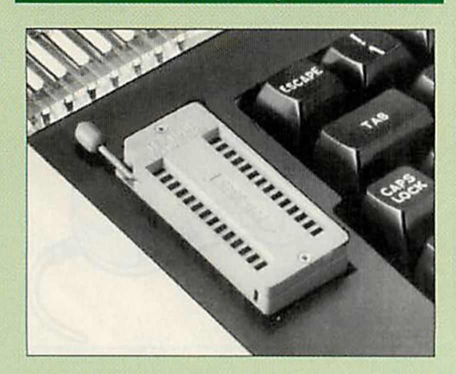
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version	**£119**
AHS-3 Archi A3000 Version	**£129**

Continued→ → → → → → → → →

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

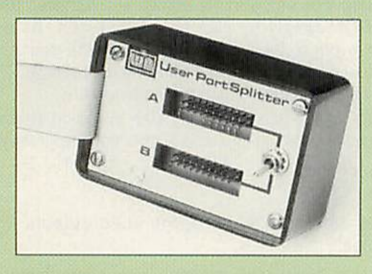
- Very simple to install. NO SOLDERING required. The ZIF eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- BBC, B and B+ compatible. **£18**

ROM Cartridges for the BBC Master

Will also accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8**; Quad **£13**

User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

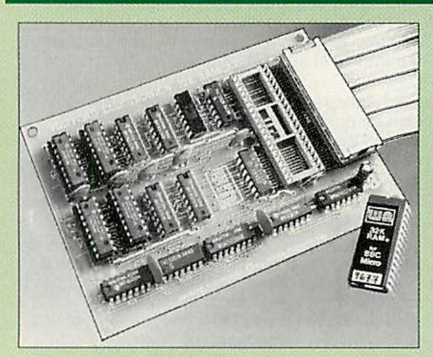
Excellent Value at **£22**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- While word processing, you don't wait for a slow printer, type in text while printing and save on expensive printer buffers.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the full 32k or the bottom 12K of the expansion RAM as a printer Buffer. (P.S. Only 12K printer buffer can be used with Wordwise & WW+, due to the way they are written).
- Unique facility to turn ROMs off and on again.

Only £54

(Price includes a comprehensive manual and the ROM)

- ARIES B-32 Shadow RAM Card £55

Commander Joystick



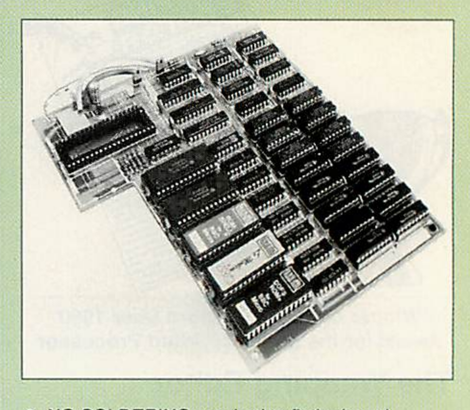
Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Price: £15

ROM/RAM Card



- NO SOLDERING required to fit the board.
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM.
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

PRICES:

- ROM/RAM card with 32k DRAM **£42**
- ROM/RAM card with 64k DRAM **£54**
- ROM/RAM card with a massive 128k DRAM **£89**

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£8**
- 16k DRAM for Upgrade **£13**
- Battery backup **£3**
- Read and Write protect switches **£2 each**

Complete ROM-RAM card with all options fitted **£109**

Voltmace Joysticks

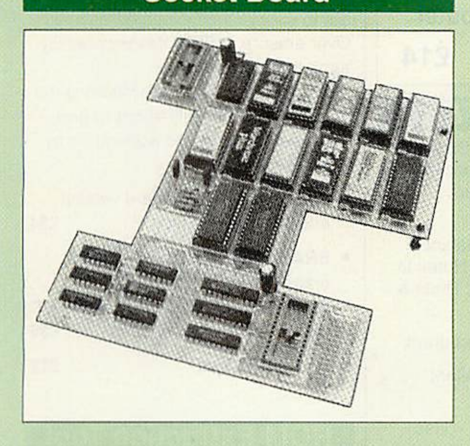
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

Solderless Sideways ROM Socket Board



The key features of this no fuss, easy to install card are:

- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer. **Only: £8**

BBC Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £20.00
- Maths with a Story 2 (Disc). 4 further maths programs. £20.00
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. £17.00
- POLYMERS O-Level program. £20.00
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20.00
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20.00
- Computers at Work – Primary £17.35
- Electric Fields 6-14 years £11.25
- Espana Viva – 3 Discs £19.95
- WHITE KNIGHT Chess game £16.00
- A Vous La France £29.00
- **FUN SCHOOL 2 – Red:** Under 6 yrs **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs **£12.25**
- **FUN SCHOOL 2 – Blue:** 8 yrs+. **£12.50**
- **FUN SCHOOL 3 – Red £18.50**
- **FUN SCHOOL 3 – Green £18.50**
- **FUN SCHOOL 3 – Blue £18.50**
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ £26
- More French Games – Another 6 games 12 years+ £26
- Au Restaurant and Accident de Route 12 years+ £26
- Boulogne and Oh-Les – 2 programs for beginners £26
- Letters to French Penpals – 11 years+ £26
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 £22
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ £22
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ £22
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years £26
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years £26
- PUNCMAN Learning punctuation
  Puncman 1 & 2 for 7 – 13 years £15
  Puncman 3 & 4 for 8 – 14 years £15
  Puncman 5 & 6 for 8 – 15 years £15
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ £18
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years £15
- Numbers & Pictures – Early number learning is a great fun (4-6 years) £15
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) £15
- Maps & landscapes No. 1 (9-14 years) £18
- Help Your Child learn Basic Map work No. 2 (9-14 years) £18
- Pirate – Educational Adventure (8-14 years) £15
- Spelling Week by Week (6-14 years) £18

Archimedes Software

- Animated Alphabet (3-6 yrs) £21
- Arcventure (8-12 yrs) £29
- Bookbinder £43
- Bumper Disc £14
- Bumper Disc 2 £14
- Craftshop 1 £26
- Craftshop 2 £26
- Converta-Key £16
- Data Word £16
- Desktop Stories £35
- DigiSim £35
- Dream Time (5-7 yrs) £23
- Droom £19
- Farm (5-7 yrs) £19
- Fleet Street Phantom (9-13 yrs) £25
- Fun School 2A Red (up to 6 years) £12
- Fun School 2A Green (6-8 years) £14
- Fun School 2A Blue (8 years +) £14
- Gate Array Teaching System £68
- Glimpse Clip Art Utility (7-16 yrs) £8
- Highlighter (6-16 yrs) £42
- Jiglet £27
- Jigsaw £28
- Mapventure (9-13 yrs) £24
- Microbugs £24
- Money Matters £16
- Nature Park Adventure (7-9 yrs) £27
- Numerator £60
- Picture Book £16
- Recall (6-13 yrs) £39
- Sellardore Tales £24
- Snippet £26
- Space Mission Mada (9-13 yrs) –
- Sting of the Dump (9-13 yrs) £22
- Target Maths £16
- Viewpoints (9-12 yrs) £33
- Wizard's Revenge (7-10 yrs) £17
- Worst Witch (7-10 yrs) £25

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below). **£14**

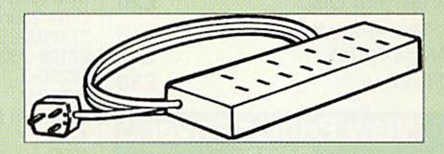
Watford POWER DUCK £8

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. **£9.50**

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System **£16**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Continued→ → → → → → → → → →

Computer Concept's ROMS

Disc Doctor	£18
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

This advance utilities ROM extends the power of your Wordwise plus ROM.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

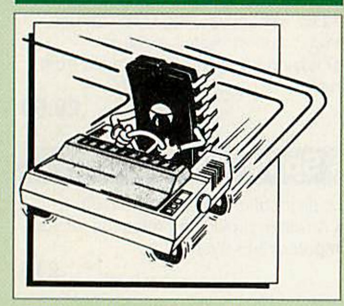
Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell – 80T disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Hi-View	£38

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

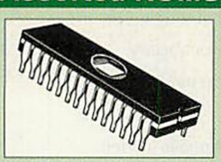
Price: Only £29

Mini Office 2 – Disc

for BBC B & B+	£12
for BBC Master	£14
for BBC Compact	£16

(When ordering please specify for which Micro & 40 or 80T Disc)

Assorted ROMS



ACORN ADFS	£25
ACORN BASIC 2 plus User Guide	£22
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ACORN DNFS	£17
Acorn FORTH	£32
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Acorn OS B+	£25
Acorn OS 1.2	£14
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Beebmon	£22
Communicator	£49
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GXR-B	£21
GXR-B+	£22
Logotron LOGO	£43
MASTER OS ROM	£38
Master ULA (47)	£15
Master ULA (60)	£10
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Microtext Disc	£46
Microtext Rom	£199
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Numerator – BBC	£39
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Rom Manager	£20
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TED	£35
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Termulator Master	£32
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74LS163	£1.00
74LS244	£1.00
74LS245	£1.00
74ALS245	£2.75
74LS373	£1.00
74LS393	£1.00
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Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

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CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/ partnership business.

FINAL ACCOUNTS – Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program.

EASILEDGER – Provides instant management information.

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All this for only **£21** (Disc)

OFFICE MATE

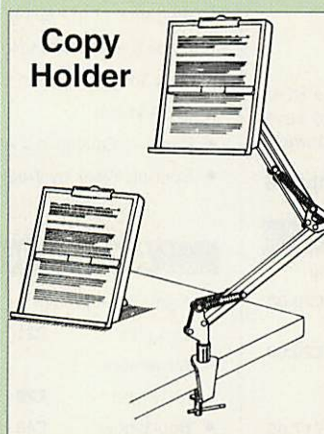
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Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip.

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(0923) 50234 or 33383

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EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!

The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast.

- **ERASER EB** – Standard version erases up to 16 chips. **£34**
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This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

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This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces. **£2.50**

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Ideal for cleaning and preventing static build-up on TV/Monitor Screens. **£2.50**

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Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

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To avoid data corruption and trouble free use of your PCs, it is advisable to clean your PC System once a week. Our Kit 14 is ideal for the purpose.

Kit 14 – 1 each, 3.5" & 5.25" Cleaning Disk, 2 cleaning pads; Drive head cleaning fluid; 20pcs general purpose wipes; Anti-static screen cleaning fluid; General surface cleaning fluid and a transparent plastic case which can hold ten 5.25" Disks when empty. **£10**

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New Release

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and hierarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £12.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: **£14.95** (No VAT)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Beeb PC (BASIC)

Designed for program authors to convert BBC programs to run on IBM PCs.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

Beeb DOS is a collection of utilities which run on the PCs and enable it to read and write information on BBC Discs.

Price: £39

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

£5.95 (No VAT)

Continued→ → → → → →

Hi-Speed, Low Cost Archi Hard Disc Drive

Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.
Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.
A powerful security feature has been provided with the two unique commands *IDELock and *IDEUnlock, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The !IDEForm Write Protect option is particularly useful in conjunction with *IDELock as it will prevent any unauthorised deletion of data.
By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Single width EuroCard
- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Built in Non Volatile RAM to hold configuration
- LED activity indicator
- 37 way D type socket for external drives
- Optional on-card 20Mb or 40Mb hard disc
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- Conforms fully to the Acorn IDE Specification
- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Up to four drives over multiple cards
- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs

Prices

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	**£249**
ADA 0530	100Mb	16mS	**£379**
ADA 0570	200Mb	15mS	**£499**
ADA 0580	330Mb	15mS	**£895**

All the above 3.5" hard drives are supplied complete with Controller Card, cable & Software on ROM. (Internal fitting). For use with A300/A400/A500 series machines.

For A3000 users an additional external Case and PSU will be required.

AAA 0300 External Case & PSU for A3000 **£85**

Internal Hard Disc Drives for A3000

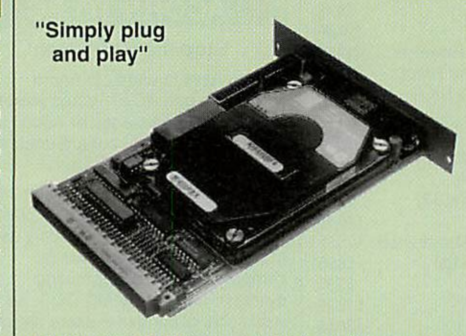
State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

ADA 0700	21Mb	23mS	**£185**
ADA 0720	44Mb	19mS	**£385**
ADA 0750	60MB	18MS	**£425**
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Supplied ready assembled. No soldering required. Simply plug into the alloted space.

Archi IDE Hard Cards

"Simply plug and play"



Watford's NEW low cost, high performance revolutionary IDE Hard Cards for the A300 and A400 series Archimedes are unbelievably easy to install – you simply slot one into any vacant podule backplane slot in the rear of your computer. These stunningly engineered, light weight but fast, 2.5" miniature hard drives are mounted onto the professionally designed cards, and are supplied with the fully Acorn-conformant IDE Filing System ready installed and ready to run. A novel feature of the hard cards is that they can be easily removed and transported to another Archimedes, for example to make a hard disc backup, or to transfer saved files from work to home etc. Security of files on the hard disc is ensured by our unique security password lock, which allows files to be read only, but not overwritten or deleted – ideal for use in school applications where the integrity of your master software needs to be retained.

ADA 0650	21Mb	23mS	**£199**
ADA 0660	44Mb	28mS	**£375**
ADA 0670	89Mb	18mS	**£675**

(Can be used as a Removable Hard Drive)



Archimedes A300/A400 SCSI Hard Disc Offer

(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £999

Offer Price: £399



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

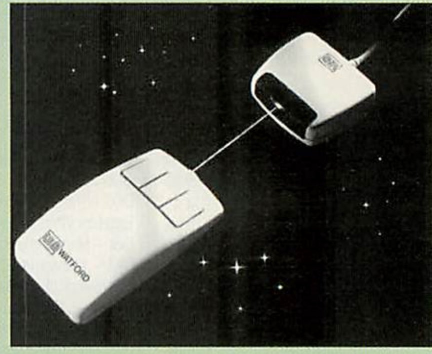
Syquest Removable Disc Units

These Hard Drive units are supplied complete with a cartridge 42Mb removable, cables and a high flow fan for cooling.

- Syquest Drive Unit pack **£399**
- As above + SCSI Card **£535**
- Spare 42Mb Disc **£55**

NEW

Archimedes Cordless Mouse



Ever found that using a mouse on a busy desktop has its problems? The cable is always being caught up in papers, tangled round equipment and other cables etc, and what about that cup of coffee spilled over your work!

Watford Electronics' new Cordless Mouse solves these problems by removing the cause for concern - replacing the cable with a simple infra red link. It still provides all the speed and easy control of a conventional mouse, but with complete freedom. In use, there are no operating differences between the standard mouse and the new cordless mouse so all mouse functions and mouse driven RISC software will be fully compatible. Pinpoint accuracy is ensured by a unique Accelerator button, which, when pressed, moves the pointer by just a tiny amount for a large slow movement of the mouse, but by a large amount for a quick wizz of the mouse.

Features

- Infra Red Signal Transmission
- High Resolution 200 DPI
- High Tracking Speed of 600mm/s up
- Anti-static Silicon Rubber Coated Ball
- Low Friction Teflon Footpads
- Power - by two AAA size batteries (not included)
- Automatic Standby Mode after 5 seconds inactive
- Auto Power Shut-Down after 20 seconds inactive

Price £59

Watford Electronics are:

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- Fujitsu Printers Premier Dealer
- Microvitec Appointed Dealer
- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Premier Dealer
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GOOD IMPRESSIONS

Graham Bell shows you seven key steps to create an Impression document that will demonstrate the package's range of advanced features

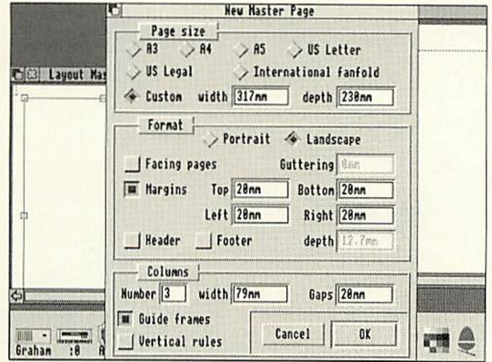
Computer Concepts' *Impression* has become probably the best-selling application for the Archimedes micros, with over 15,000 copies sold and a small industry of books, training courses and other resources forming around it. It has developed steadily over a two-year period, and now stands at version 2.16. *Impression's* abilities stretch from simple wordprocessing and letter writing to professional black and white publishing. Indeed *Acorn User* itself is created using it.

But it is a complex package, and few use – or need – all of its capabilities. Fortunately, it's also an application that can be tackled a bit at a time – you don't need to understand all of it before you begin. Here is a selection of hints, tips and advice on good practice. The example is an information leaflet, a single A4 sheet printed both sides, and folded twice to give a standard six-page leaflet. It uses many of the techniques and tips described in the boxes.

STEP ONE: THE MASTER DOCUMENT

To make up a leaflet like the one in our example, fire up *Impression* in the usual way. A click on the icon creates a new document. The first step to creating the leaflet is to create the master page design. On *Impression*'s Edit sub-menu, click View master pages, then press Menu again to choose the New master page option.

The dialogue allows you to set up the page size and margins for the leaflet: it's landscape and slightly bigger than A4. The margins are 10mm all around, plus an extra 10mm for the crop marks and bleed allowance, but you don't need to set these up. Notice how the Guide frames button is pushed, so that guides rather than real frames are created on the master page. Click Okay and note the ID number of the new master you've created.



Creating the new master page

STEP TWO: ADDING FRAMES

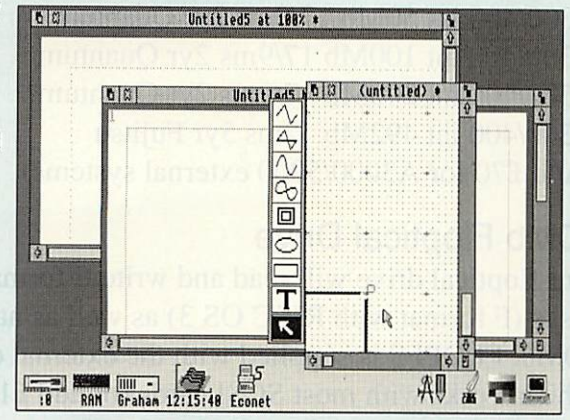
Still on the new master page, the next step is to add the tiny frames in the corner that hold the crop marks, and a guide frame 297 × 210mm to show the real edge of the paper. You can at this point close the Master page window. To make the main document, follow the new master page design, choose the Alter chapter dialogue, and change the master page number to that of the new master design. Make sure that you save your work at this point.

Since this is to be a six-panel leaflet, click on any of the guide frames, then choose Insert new page from the Edit sub-menu. Now draw the six real frames in. Remember the key shortcut for

CROP MARKS

Some documents call for bleed: that is, some parts of the page design will go right up to the edge of the paper. Yet on most printers, you can't print right up to the edge, so you have to print on paper that's larger than the final size and trim the excess off. Crop marks are tiny ticks to show where the paper is supposed to be trimmed. A 'bleed allowance' is when you take a feature slightly beyond the crop marks: that means if the trimming isn't quite accurate, there won't be a white line beyond the black.

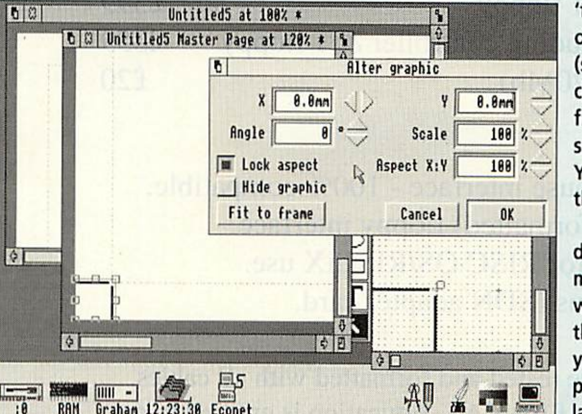
Impression has the ability to put crop marks on automatically – there's a button in the Print setup dialogue. But these are off the page, so you can't make any bleed allowance. The solution is simple: make up all your pages 20mm larger in both dimensions than the finished document. Then put tiny frames in each of the corners of the page to hold your own crop marks, and you've got a 10mm bleed allowance.



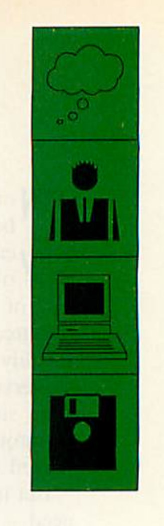
First make up a Draw file with the crop mark pattern shown. Make the pattern 10mm in each dimension, make the lines 0.25 or 0.5pt thick, and put the pattern exactly at the bottom left of the page.

Then, on the Impression master page, put an 11mm frame in the bottom left corner of the page. Make it transparent, non-repelling, and drag the Draw file into it. Now go to the Alter graphics dialogue, and make sure the scale is 100% (it will be bigger, so reduce it). Press OK. Go back to the Alter graphics dialogue and adjust the X and Y offsets to 0mm.

There are four corners to the page, but you don't need to create four drawings: you can 'flow' the drawing from one frame to another (select one frame then click Adjust on the other frame), and rotate it to suit the other corners. You'll have to sort out the offsets too.



When you print your A4 document with crop marks, they probably won't be shown, because they are off the page. But you can see them if you print at 90% scale, or on a larger format printer.



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A300/400 int 492Mb 12ms 5yr Fujitsu	£1199

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Our floptical drive will read and write E format disks (F format with RISC OS 3) as well as native 20Mb. FLOPFS is supplied with the external drive which works with most SCSI cards (or add £100 for a Morley card). The A5000 internal comes with our own SCSI interface designed specifically for the floptical drive, plugging into the Econet port - using no slots. Transfer rate is 100k/s typically & 80ms seek time.

External including 1 floppy	£399
Internal A5000 including controller & 1 floppy	£359
Floptical floppies (20Mb)	£20

Coming soon

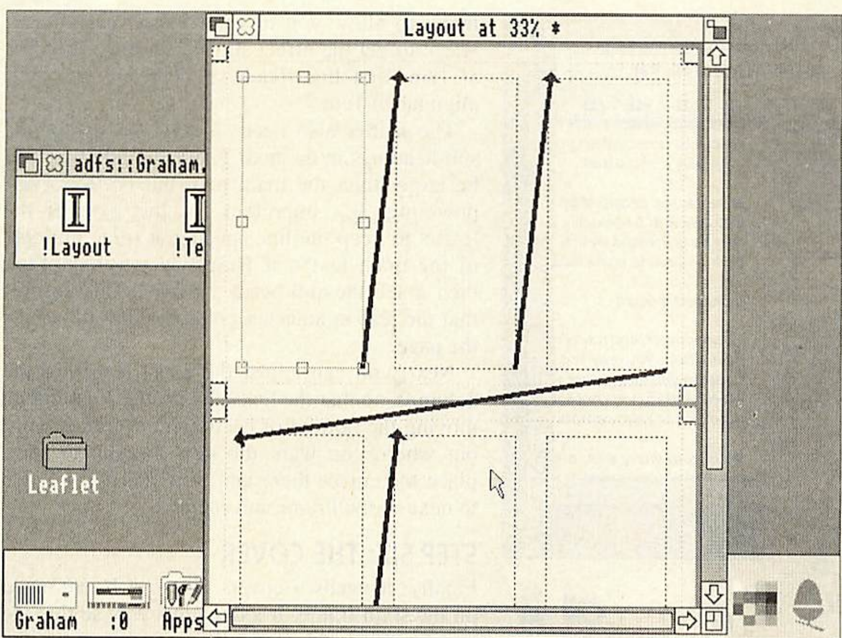
- IBM keyboard/mouse interface - 100% compatible.
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Crop marks, text frames and text flow are set up first

inserting a frame is Ctrl-I, but you could also draw the first, then copy (with Ctrl-C) and paste it five times (with Ctrl-V). Make sure Snap to guides is on first – it should be ticked on the Frame sub-menu.

To link the frames so that the text flows automatically when it's imported, Select the first frame on page one, then click Adjust on the next four. It's easiest to do this when you can see the whole document, so change to a small scale beforehand, with Shift-F3 or the Scale view dialogue (Ctrl-F9). Leave the last frame on the second page unlinked, as this will become the cover of the leaflet. The Show flow option on the icon bar menu confirms the way the frames are linked.

STEP THREE: THE BASESTYLE

If you have a good idea of what your document will look like, then this is the time to set up some of the style sheets. These control details of the look of the text – how big and in what typeface. This simple leaflet needs only a few styles.

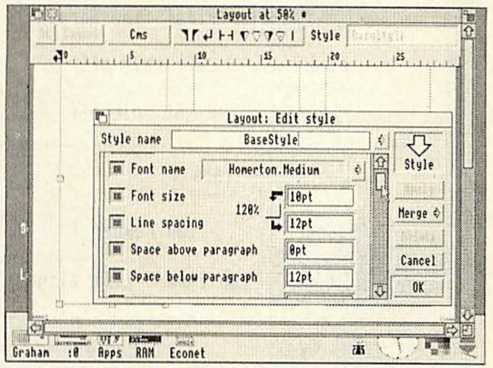
Remember that the main text in a document should be defined in *Impression*'s Basestyle, and all the rest of the styles should be modifications of that. So in this case, press Ctrl-f6 to enter the Style editor. Basestyle is set up to give Homerton.medium, at 10pt on 12pt line spacing (otherwise known as 2pts of extra leading). Space above paragraphs is set to 12pt too.

You can remove all the tabs from the ruler by dragging them a little way upwards, away from the ruler scale. The rest of the Basestyle can be left alone. The two Italic and Bold styles can be set to change the typeface to Homerton.medium.oblique and Homerton.bold respectively, but they shouldn't change any other attributes. Leave all the buttons on the style editor unpushed except for 'font name'.

The styles are layered on top of one another, so that any Italic text will inherit everything except its typeface from the underlying Basestyle. If there's a lot of bold or italic text, it's useful to make a function key give each of these styles: conventionally Italic is attached to f3 and Bold to f4. This is achieved using the Style control at the very bottom of the style editor dialogue.

STEP FOUR: ADDING TEXT

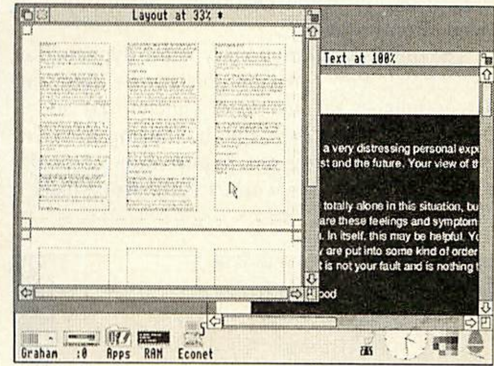
The text can be written directly into the frames on the leaflet pages. But this isn't a good idea – you should not be concerned with the page design when you're worrying about what the



Setting up basestyle with the style editor

words should be. And the details of the design, perhaps involving narrow columns, might not be best suited to wordprocessing. An ideal method is to create a separate *Impression* document called Text to use as a wordprocessing document – one with a straightforward, single-column layout and clear, readable text.

The text can be flowed into the pre-prepared layout by selecting the first of the main text frames and dragging in the text file icon. Or, if you've used *Impression* itself to wordprocess the text, simply highlight it in one document, copy it with Ctrl-C, then click into the frame you want and paste it in with Ctrl-V.



Text is flowed into the frames on the page

Once text is written, use the spelling checker. It's worthwhile building up a personal list of words that you often use that aren't already in the *Impression* dictionary. First, go to the Dictionary dialogue using Ctrl-f8, and use the Create option on the menu to make a UserDict. Beware – the menu only pops up if you aren't pointing at one of the buttons in the dialogue.

When the spelling checker comes across an unrecognised word, there are three options. If it's a mistake, correct it by highlighting the correct spelling then clicking on Replace. If you rarely use the word, or it's something specific to this document – not a real word but part of a postcode for example – then click on Ignore. This adds it to a temporary list of 'words' that's

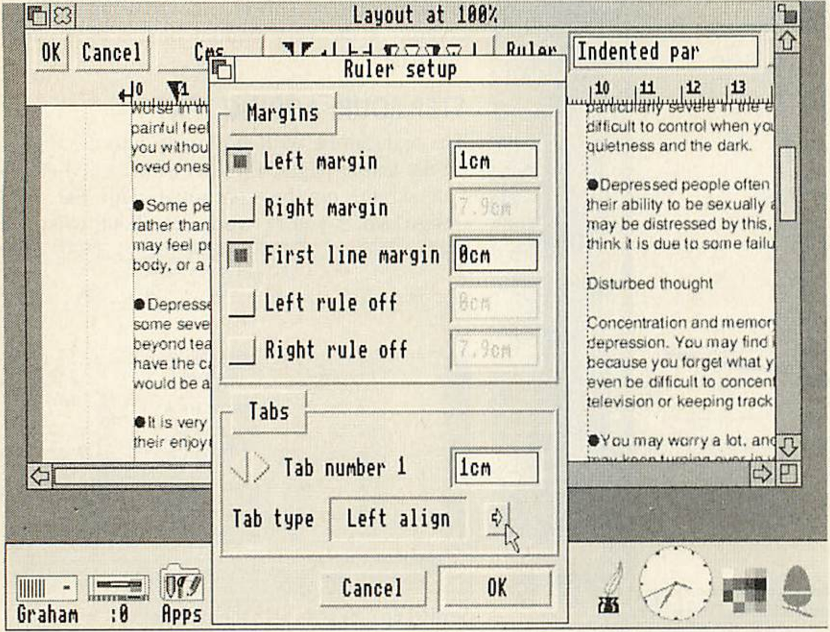
WORD FOR WORD

If your document contains a lot of text – more than just a few hundred words – then it is not sensible to type all of that directly onto your finished page design. The job of text creation and page layout should be done separately. It's worth using a wordprocessor to create the text.

The best way is to create two documents, one which has the page structure set up for your real document, and one which has a simplified page layout for wordprocessing plain text. You can load both at once, type your text into one, then cut and paste the text from one on to the real document.

When creating a template document, don't just add your styles and master pages to the existing ones. It reduces the size and complexity of your files if you delete the unnecessary styles. So if, like the example leaflet, there are only a few styles of type that you need, then delete all the built-in ones like 1inch indent and Hanging indent first – there's a Delete button in the Style editor dialogue box. If you create both your wordprocessing and page layout templates with the same set of style names, then the text will automatically set into the right style when you cut and paste.

The styles don't need to be the same – they just have to have the same names – so the wordprocessing styles can be 'tuned' for readability on the screen by using Homerton medium at 14point size for example, even if the real page layout specifies Pembroke at 9point.



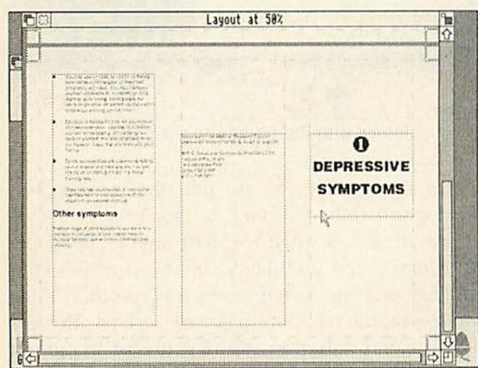
Setting up a ruler called indented par to produce the indented paragraphs

kept to refer to only until you switch off or reset your computer.

Finally, if it's a word you want to add to your user dictionary, then click on Add word. They could be common names, specifically scientific terms, or a range of rarely-used words missing from the main dictionary, or even foreign language text. If you check the spelling of most things you type, you'll soon add a few hundred words to the user dictionary, which will end up covering almost everything.

Make sure you quit *Impression* in an orderly way, as only then are the user and exception dictionaries saved automatically to disk. There is a Save option in the Dictionary menu, but you need never use it.

The other useful dictionary is for hyphenation exceptions. You can view this list by choosing Exceptions in the Dictionary menu. To add a word, type it into the white box, using numbers to indicate the preferred hyphenation (3 is the best place to split the word, 1 is the worst place). Then click on Add word.



Producing the cover for a fold-up leaflet

STEP FIVE: TWEAKS

This particular text needs only a little more work. There are a number of bullet points, where the text needs indenting. This can be done by making a new ruler called Indented par. Shift-Ctrl-N leads to the Ruler setup dialogue. Type the ruler name into the white box, then use the Ruler menu to allow you to enter exact ruler dimensions: to get the effect shown, set the left indent at 1cm, first line indent at 0cm and set a left align tab at 1cm.

The leaflet also needs a style set up for the sub-headings in the text. These should obviously be larger than the main text, but not too overpowering. It's important for the look of the leaflet to keep the line spacing at some multiple of the main text – if Basestyle is set on 12pt, then make the sub-heads on 24pt. This ensures that the text in adjacent columns lines up across the page.

Next, you can adjust the exact length of the columns, so that the text falls neatly. Rather than moving the bottom of each column frame, work out where you want the next column to start, place the cursor there and press Ctrl-G (or Force to next on the Frame sub-menu).

STEP SIX: THE COVER

Finally, it needs a cover. This can be arranged on the sixth frame. It's done this way so that the text can flow automatically from frames on the first page (which forms the inside of the leaflet when folded) to the second (which forms the back and the cover). Text cannot flow backwards from page 2 to page 1 in *Impression*.

The top of the cover frame is lower to put the cover text a little above the centre of the page – this gives a nice, balanced look to the leaflet. The text on the back cover (the middle frame on page two) can be aligned with this by lowering the top of the frame to match – just as Snap to guides makes following the guide frames easy, make sure Snap to frames is ticked on the Frame sub-menu to do this bit. If you find Snap to Frames missing from your copy of *Impression*, then an upgrade to a later version is available from Computer Concepts.

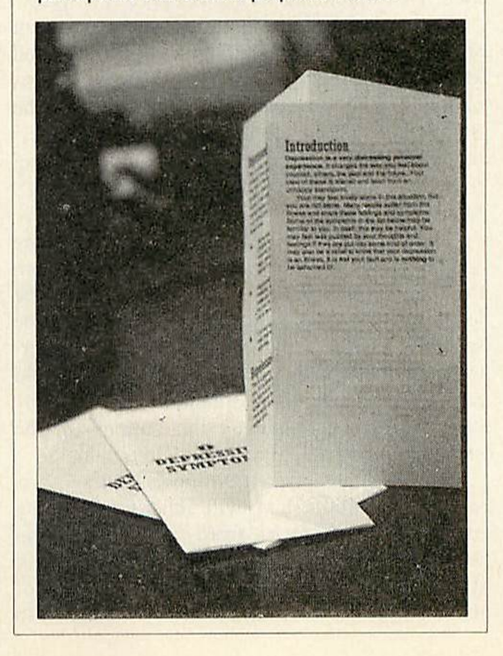
Next month, we'll take a look at adding a tear-off to the leaflet, and sending it to a bureau for really professional printing.

HINTS AND TIPS

- You can set up an Auto save process via the Preferences option on the Document sub-menu. This will save the file for you every few minutes. But it does have a drawback: it tends to save just after you've made a hideous mistake – overwriting the good version. So always set the Prompt option.
- New documents are based on a Default document stored inside the Impression application: if you create a new Default, then all your new documents will follow the new style. To find Default, Shift-double click on Impression and open the Auto folder.
- Importing text from Edit can sometimes be confusing. Edit uses newline characters to format the text into lines, whereas Impression uses them to separate paragraphs. In Edit, use the Find dialogue (f4) to search for \n\n (remember to turn Magic characters on), and replace them by \x0D. Replace to the end of the file (you can just press E). Now replace \n with a single space, and finally use the CR<->LF option. Your text is now ready to import straight into Impression.
- Effects are used very sparingly in this document – only the bullet points and the number on the cover are set into Selwyn using an effect. The bold and italic text uses styles, not effects, because these are easier to change at a later stage. It's simple to change all the Homerton.oblique to Trinity.italic if it's in a style, but altering many Text font effects would be time-consuming.

THE FINAL RESULT

And this is how the final document looked – or perhaps it's one that we prepared earlier!

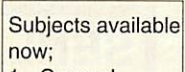


TopicArt

A new form of clip art comprising of single discs containing approximately 50 hand drawn high quality draw format clip art images, each on a single subject. Site and area licences are available, please ring for details.

£8

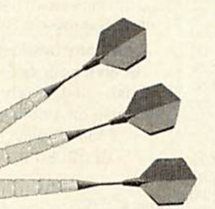
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4 - Entertainment
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TopicArt6 - RoadSigns



TopicArt7 - Sports Equipment





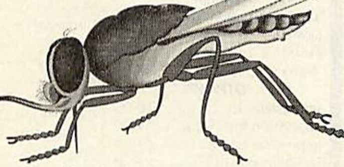
TopicArt4 Entertainment

7 TopicArt subjects are available now. Please specify when ordering.



TopicArt3 Costumes





TopicArt5 - Bugs to Slugs

SCSI Floptical Disk Drives

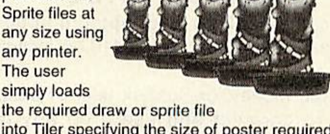


= 20Mb

Yes its true!, each 3.5" floptical diskette can hold 20Mb of programs and data etc. Floptical disc drives which are SCSI devices are a wonderful complement to existing SCSI hard disc users or as an alternative to a hard disc solution. Transfer rates are typically 65ms/100k/sec and like standard floppies are competely transportable. Flopticals are also a good media for backing up hard discs. All units are externally housed in an attractive case with power supply and includes one floptical floppy.

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A5000 Internal Floptical kit (with SCSI card)	**£359**
Floptical floppies (20Mb)	**£20**

Tiler £10+VAT



A printing utility which allows you to print Draw or Sprite files at any size using any printer. The user simply loads the required draw or sprite file into Tiler specifying the size of poster required, using a preset paper size, ie. A2, A0 etc, or as a percentage of the original size or in physical dimensions, ie millimetres. The document will then be increased or decreased in size automatically and printed over several pages with crop marks provided on each page to assist cutting/overlapping.

MegaUtils £10+VAT

A set of genuinely useful RISCOS utilities
!AddrBook An easy to use address book.
!Diary A place to store your birthdays etc.
!CleanUp A hot key util for redrawing windows.
!Disable Prevents you from deleting any file.
!DOSForm A multi-tasking DOS 720k formatter.
!FileMon Displays information about any file.
!LineClock A desktop clock.
!MegaUtils provides a window organiser, key short-cuts to open/close filer windows, set copy and wipe options, set filetypes, quick loading of basic programs, caret flasher, selection of mouse speed, automatic opening of applications, mouse hider, caret grabbing.
!QuickMode Select modes with ease.
!QuickRun An application loader.
!ScrGrab Allows you to save the screen display to a Sprite.

Hardware, Software & Books (All prices exclude VAT)

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LEARNING CRV PRINTER SYSTEM Including Acorn JP-150 Ink Jet Printer	

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As above with Monitor	£789
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£215 Deposit plus 12 monthly instalments of £155	
A3000LC System	£999
£99 Deposit plus 12 monthly instalments of £75	
A3000LC Printer Sys	£1275
£135 Deposit plus 12 monthly instalments of £95	

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Up to 4Mb RAM	£129
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520Mb 12ms Cache	£999
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100Mb 18ms Cache (2nd Drive)	£250
IDE A3000 External	
40Mb 17ms	£315
80Mb 17ms Cache	£399
125Mb 18ms Cache	£485
180Mb 18ms Cache	£535
IDE A3000 Internal Hard Cards	
20Mb	£199
SCSI Archimedes Internal	
50Mb 17ms Cache	£339
105Mb 18ms Cache	£429
180Mb 18ms Cache	£599
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SCSI A3000 External (with int card)	
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(Add £30 for Archimedes External)	

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Taxan 770+LR	£379
Taxan 795A	£439
Taxan Viking II	£749

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Canon BJ-330	£409
Citizen Swift 24e	£235
HP DeskJet 500	£329
HP DeskJet 500C	£549
Star LC24-200 Mono (Col +£40)	£199
Laser Direct (Qume)	£799
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Laser Direct HiRes8	£1319

Printer Consumables

BJ-10 Ink Cartridge	£17
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DeskJet 500C Colour Cartridge	£27
LBP-4 Toner	£60
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Swift 24 Colour Ribbon	£15

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Dabs Archi Operating System	£14.95
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Basic V: A Dabhand Guide	£9.95
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1st Word+ Manual (Acorn)	£10.00
Acorn DTP Manual (Acorn)	£10.00
AASM Manual (Acorn)	£25.00
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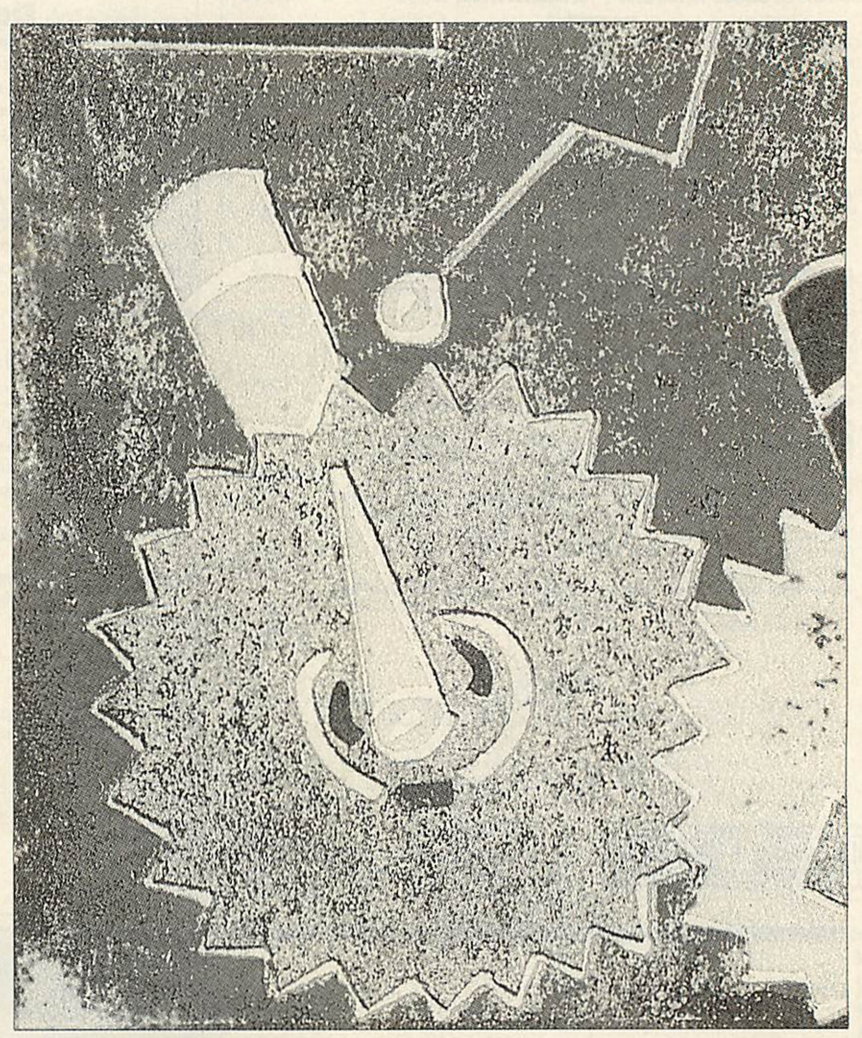
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ASSEMBLY LINE

DAVE LAWRENCE gets shifty with this month's assembly advice

Last month I left you with a little puzzle – how can you multiply by 3600 (the number of seconds in an hour) using just three simple Arm instructions? There are, in fact, quite a number of solutions to this and I arrived at mine through the following steps:

3600 = 16 × 225
3600 = 16 × (256 - 31)
3600 = 16 × (256 - (32 - 1))

At each stage I tried to get the numbers I was using to be powers of two. Working from the innermost brackets outwards, this can be translated into Arm instructions as follows:

```
RSB R1,R0,R0,LSL #5
RSB R0,R1,R0,LSL #8
MOV R0,R0,LSL #4
```

The program *Arm1* shows this in action – try changing the initial MOV R0,#2 to verify the method. Of course, you could really make use of the multiply instruction:

```
MOV R1,#3600
MUL R0,R1,R0
```

But there are disadvantages: you cannot always directly load the value you want to multiply by into a register; you always need an extra register to hold the other number (if you are cunning, you can 'build' a multiply that uses only your original register) and perhaps most significantly, a multiply can, at the very worst, be over 16 times slower than a simple MOV!

MORE SHIFTS

So far I have dealt with the two simplest shifts, Logical Shift Left (LSL) and Logical Shift Right (LSR). These shift the bits within registers *logically* – without any further considerations. If you think back to my second article (in the March issue) where I introduced negative numbers and described the twos complement notation, you should remember that negative numbers have their top bit (bit 31 on the Arm) set. This adds an extra little twist to shifting numbers.

For example, say we were working with an eight bit processor, as it is fewer digits to write down, the number 12 would be represented by the binary number 11110100, shifting the number right one place (trying to divide it by 2) would give 01111010 or 122 in decimal. My calculator says that -12 ÷ 2 is -6, so we seem to have a little discrepancy!

In fact, -6 in binary is 11111010, and as you'd expect the top bit is set. What we could do is have a right shift especially for negative numbers, that places 1's in the top bit rather than 0's. This wouldn't be useful for positive numbers though and would tend to lead to messy code which would have to check the sign of a number before shifting it.

Instead what we have is an Arithmetic Shift Right or ASR for short. This works for both positive and negative numbers and moves all the bits right in the register but preserves the status of the top bit, thus keeping the sign of the number intact.

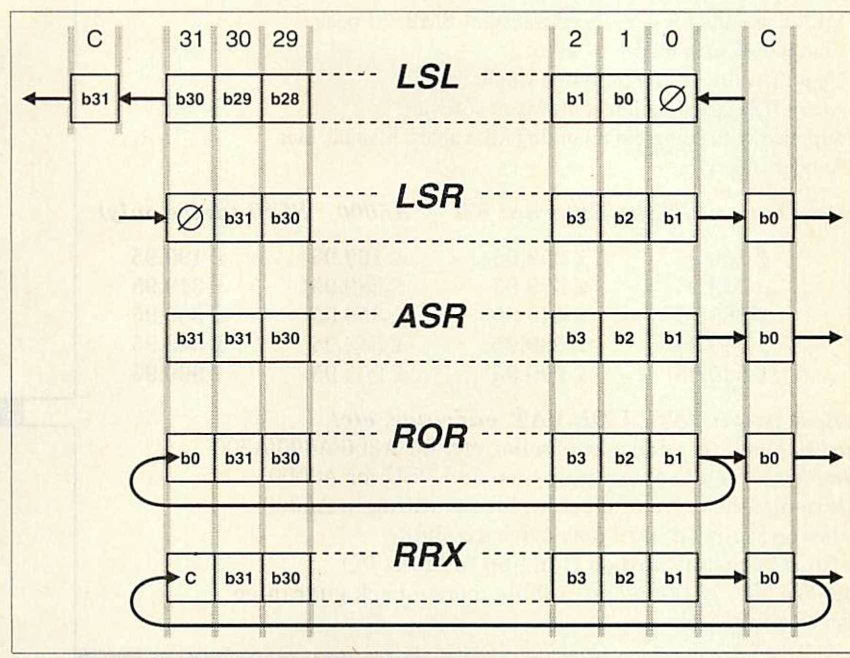
There also exists an Arithmetic Shift Left (or ASL). However this performs exactly the same function is the logical shift. If you think about it, a left shift of a positive number will always double it (assuming no significant bits are lost out of the top of the register), also a left shift of most 2s complement numbers will also double them. For example, if we double -12 (11110100) we get -24 (11101000) which could be performed with a logical shift.

If you imagine the number -12 in a 32-bit environment, it would have an awful lot of 1's at its 'top end', meaning that it could be doubled many times with logical shifts before an incorrect result was generated. Such a result will, in fact, only be produced in a situation where the negative number can not be represented. For

example, back in eight bits, the number -127 (10000001) doubled would give -254. Shifting the bits left would loose the top bit and shift a zero in (giving us 00000010) thus losing the numbers 'negative-ness' and giving us the incorrect answer of 2.

But, the number –254 cannot be represented using eight-bit twos complement anyway! Hence there is no need for an arithmetic shift left. The Arm assembler will still recognise the three letters ASL, but it will merely assemble the code as if you this was an LSL. So, if these two instructions perform the same function, what is the point of having them both?

Well, when you are writing a piece of code, it is sometimes helpful to maintain some degree of coherence. If you are treating the registers as numbers (both negative and positive), it would make sense to use ASLs and ASRs. If you are viewing the registers as mere collections of bits, then LSLs and LSRs might make your code easier to understand. One word of caution; be careful when right shifting, as ASR and LSR perform different functions – make sure you use the right one!



Five shifts in action: LSL, LSR, ASR, ROR and RRX

SIGN EXTENSION

Before moving on to the last sort of shifting, here's a practical use of shifts. Say you were working with a large quantity of smallish numbers, in fact, small enough for them to fit into eight bits and you are making use of this fact to save a large amount of memory by storing them in single (eight-bit) bytes rather than full (32-bit) words. The problem comes when you try and perform any arithmetic on these numbers.

As I have outlined in the past, negative numbers are represented slightly differently according to how many bits you have available, thus -12 in an 8-bit, 2s complement environment is 11110100, but on the Arm there would need to be an extra 24 1's to the left of this! The above number will simply be interpreted as an eight-bit positive number (244, to be precise). All positive numbers will be acceptable since those top 24 bits will be 0's. What we need is some way of 'copying' the sign bit of our eight-bit number all the way up to the top of the 32-bit Arm register. This can be performed with two Arm instructions:

```
MOV R0,R0,LSL #24
MOV R0,R0,ASR #24
```

The first instruction moves the eight-bit number into the top eight bits of the register (the sign bit is therefore shifted up into bit 31 of R0 - *its* sign bit). The second instruction moves them back down to the bottom again, but because the shift is arithmetic rather than logical, the sign bit is preserved. This process is called 'sign extending' a number – we are extending the sign of the eight-bit number from one bit to 25 bits. The program *Arm2* illustrates this in action.

ROTATES

The final type of shift is called a *rotate*. I don't want to dwell to long on rotates for the moment as they will only come in useful when I deal with registers as collections of bits, later in the series. I'll just give you a brief overview of what they do. The instruction that we use for rotating is called ROR and it stands for ROtate Right. It behaves in a very similar way to the LSR instruction that we have met already. The difference being that the bit that 'falls out of' bit 0, in addition to being placed in the carry flag (refer to last month's article) is also copied into the top bit of the register instead of the zero that gets put there by LSR.

> **YELLOW PAGES**
>
> Both of the programs mentioned in this article, Arm1 and Arm2 can be found in yellow pages. Alternatively, you can load the programs from the monthly subscribers' disc.

Therefore no information is lost – all the bits of the original are kept, they're just in a different order! There is no mathematical significance behind a rotate, after all, you're dividing a number by two and changing it's sign according to whether it was odd or even!

There are couple of things to note, firstly there is no explicit rotate left instruction; this can be performed by rotating right by 32-leftshift. For example, a left rotate by one place is identical to a right rotate of 31. Finally, a rotate right of zero, would effectively do nothing at all, so instead of 'wasting' this instruction, a special case has been defined, this is called RRX or Rotate Right with eXtend.

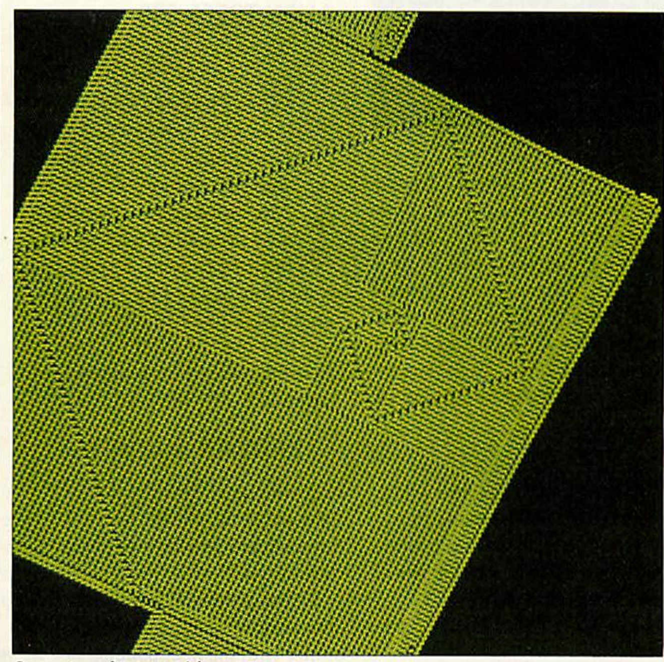
This behaves like an ordinary right rotate except that the bit that gets placed in the top bit of the register comes from the carry flag rather than bit 0. (Bit 0 is copied into the carry flag as with a plain rotate right.) This comes in handy when dealing with numbers larger than 32 bits, which I will come to later in the series. Rotates can sometimes be used in code to swap two halves of a register. For instance, the instruction: MOV R0, R0, ROR #16 will swap the top and bottom 16 bits of R0.

To gain a clearer idea of how the registers can be used take a look at the figure above. This shows graphically, the effects of all the five shifts available. All except RRX can be of any size, which can either be an immediate constant or a register.

Next month, we will be moving on to some more involved programming techniques. I'm going to introduce branches and condition codes. With these we will be able to build some Basic-like structures and finally have some useful example programs!



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Some turmites are tidy creatures . . .

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MEGATURMITE

Michael Rozdoba of Bedlington has produced a fascinating graphical version of the famous Turing machine. *Termite32* runs on any 32-bit machine and there is also an eight-bit version, *Termite8*. Simply enter and run the listing and enter a number from one to six. Michael explains what the program does:

"In the 1930s, mathematician and logician Alan Turing proposed an abstract elementary computer capable of carrying out any computation which can be formally stated—in short, a general purpose computer. Yet the device, a Universal Turing machine, was extremely simple.

"To visualise it, imagine a small black box device which sits on top of a very long paper tape. The machine is able to shunt the tape left or right, and to write and read symbols on the part of the tape that lies directly beneath it. These symbols could be different shaped and coloured blocks – it doesn't really matter. Also the device has memory, allowing it to remember an internal property called the machine's *state*. It is convenient to label the different states A, B, C and so on.

"The machine's program consists of a two dimensional array, where the rows are indexed by the various internal states and the columns by the different symbols. Each entry in the array contains three pieces of information: a symbol, a state and a direction (left, right, or stop).

"Initially, the machine starts in state A. It then processes the symbols in the following manner. Reading the symbol beneath it, it uses this, together with its current state, to recall from its program the corresponding stored symbol, state and direction. The machine then adopts this new state as its current value, replaces the symbol it has just read with the new symbol and then moves the tape in the direction indicated. This process then repeats, either indefinitely or until the stop instruction is found. In the latter case, the final contents of the tape make up the program's output.

*INFO COMPATIBILITY TABLE

LISTING	NAME	BBC B	MASTER	ELECTRON	ARC
Info 1	Termite32				*
Info 2	Termite8	*	*	*	
Info 3	Lines				*
Info 4	GiantECF				*
Info 5	AlienTree				*
Info 6	Wierdo				*
Info 7(a)	Graph+				*
Info 8(b)	SquashS				*
Info 9	CompDemo				*
Info 10	CDown	*	*	*	*

NOTES (a) Additions to Decembers Graph application. The full working version is on this months subscribers disc. (b) Risc OS 3 only.

"The purpose of this is to allow the theoretical study of logical processes and computability. It turns out that this device is capable of calculating any computable function.

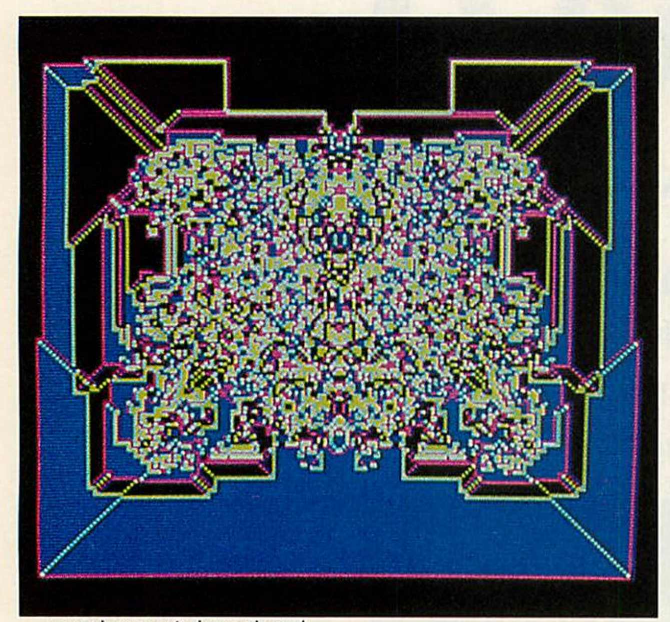
"More recently Greg Turk (at the University of North Carolina) experimented with extending this idea from a one-dimensional tape to a two-dimensional grid. Instead of thinking of the tape moving through a stationary machine, imagine the machine moving over the grid like a turtle in Logo. He calls this a Turmite (see the September '89 issue of *Scientific American* for more details). The Turmite's program works in the same way as for the Turing Machine; the only slight difference being that directions in which to move are specified as a rotation through 0, 90, 180, or 270 degrees followed by a move forward. There is no stop instruction."

Turmites are no more powerful than Turing Machines – they are equivalent. However, as the turmite lives in a 2D world, the calculation that the turmite performs can be displayed on screen, giving graphical patterns which evolve with time.

In Michael's program the grid corresponds to the matrix of pixels making up the screen. Each symbol is a single coloured pixel and there are eight valid symbols. Wraparound is used, so that if the turmite moves off one side of the screen, it reappears on the other. The turmite starts from the centre of a black screen in state A.

Six 'programs' for the turmite are included in the listing – select one at the start. To stop the turmite at any time, press ESCAPE. SHIFT+ESCAPE will terminate the program.

You can also quite easily add your own 'programs'. You can have up to eight states and eight colours in one program, although this can be increased, if needed. Each program is


. . . some just aren't domesticated

preceded by a number (-1, -2 and so on). Following this is a list of instruction pairs. Each pair corresponds to the action taken upon finding a particular colour in a particular state.

Each instruction consists of five pieces of data. These are: the state to which the instruction applies (A-H); the colour to which the instruction applies (bla, red, gre, etc); the colour to which the current pixel is changed (bla, red, gre etc); a turn (l=left, r=right, f=forward, b=back); the new state of the turmite (A-H).

For example, imagine the turmite is over a green pixel and in state B. The instruction for (green,B) is looked up. This might tell it to change the pixel to blue, turn left 90 degrees and become state A. This instruction would be listed as: DATA B,gre,blu,l,A. One of the colours used must be black, as that is the initial colour of the display.

Finally, you could try starting the turmite on a screen made up of random turmite colours, rather than on a solid black display. The results are nearly always unexpected and have to be seen to be believed! If you come across any interesting or unusual turmite programs, then please send them in.

Michael's program is officially called *Megatermite* since it manages to process over 170,000 symbols per second on an Arm2. Arm3 users might well like to switch the cache off to avoid missing some of the graphical effects! The predecessor ran at only one-eighth of the speed, checking the keyboard with a SWI call after each symbol replacement. *Termite32* only checks every 1024 steps and the amazing increase in performance is a good reminder of the high overheads of the system calls.

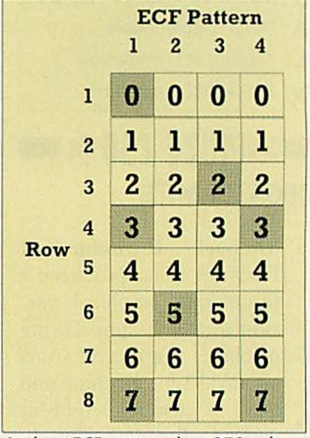
EIGHT-BIT TURMITES

As is our policy in *INFO, wherever possible we like to give eight-bit users versions of 32-bit submissions. *Termite8* is the result of much honing of machine code and is a respectably fast eight-bit turmite running in mode 2. The program works in an similar way to *Termite32* and the programs are stored in the same format.

ALIEN TREES £30

We've another set of programs from regular **Jan Vibe**. The first, *Lines*, follows on from Jan's earlier procedures to produce smooth colour scales in 256 colours modes. Jan's new procedure uses dithering to produce a speckled transition from one shade to another. This is made possible by the use of ECF patterns, first introduced on Masters and extended on the Arc. *Lines* plots tubular lines that start and end with randomly selected colours and the so-called giant colour pattern is used to produce the dithered, in-between stages. This pattern actually consists of the four individual ECF patterns, lined up side by side.

If you have not used ECFs before it is worth describing them briefly, as they are a handy way of mixing colours. Each of the four definable

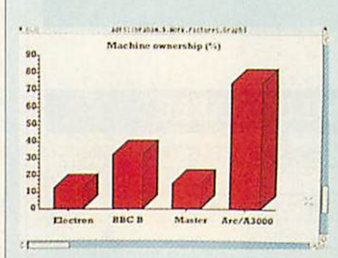

ECF Pattern

Row	1	2	3	4
1	0	0	0	0
2	1	1	1	1
3	2	2	2	2
4	3	3	3	3
5	4	4	4	4
6	5	5	5	5
7	6	6	6	6
8	7	7	7	7

A giant ECF pattern in a 256-colour mode as used in Lines

READER SURVEY

A big thank you to all those who completed the *INFO reader survey: it has given us an invaluable insight into what you would like to see in these pages.



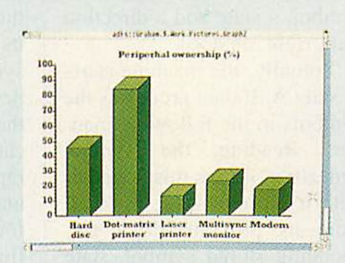
The first chart shows some general details revealed by the survey. Some 74% of readers now own 32-bit Acorn machines, although 32.7% have Beebs. Many of you, 30.8% to be precise, own both eight-bit and 32-bit machines, whereas 22.1% only have eight-bit equipment and 43.3% only 32-bit. As you know, it is our policy in *INFO, while recognising the general trend towards 32-bit, to provide wherever possible eight-bit versions of programs. Looking back over recent *INFO, from October '91 to March '92 we carried 30 items suitable for eight-bit users, versus 43 for 32-bit users.

And, although most new submissions are 32-bit, we will be continuing to provide eight-bit conversions.

On the peripheral front, just about everyone has a dot-matrix printer with the next popular choice being laser printers. Multisync monitors are now pretty common and given that only 32-bit users are involved, the figure becomes 32.5%. Midi equipment is owned by 7.7% and 4.8% have Hybrid music hardware.

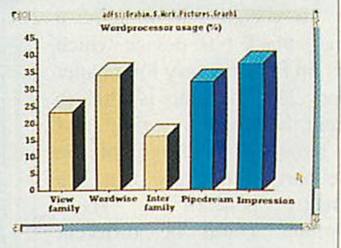
Over a third of eight-bit users have sideways Ram (very useful for us to know—an extra 16k often comes in handy) and 61% of 32-bit users have extra Ram. Another unexpectedly high result is the number of Arc owners with Arm3s—now nearly 20%.

Of our readership 61% consider themselves to be competent Basic



programmers and 20.2% competent at machine-code. This isn't too surprising since the column is intended to provide all sorts of programming advice!

A slender majority (51%) prefer *INFO to its predecessors, with 42.3% disagreeing and 6.7% of don't knows. However, 60.6%



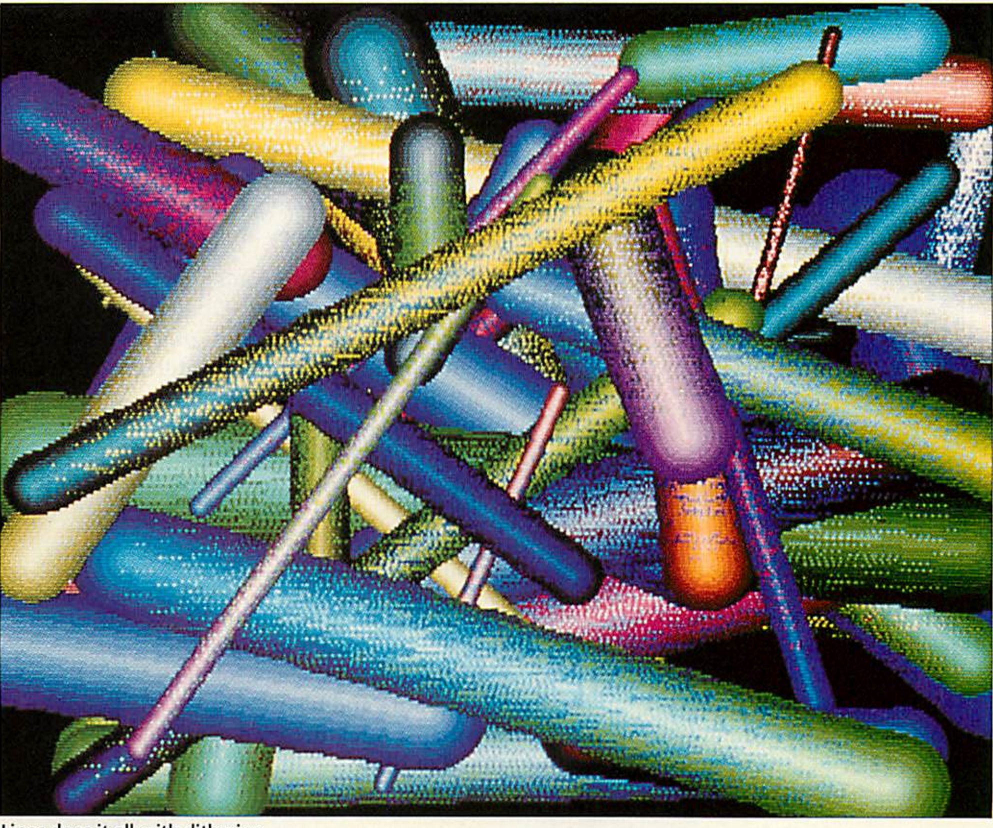
would like to see more of *INFO in general and 66.3% say we cater for them in general. We hope to increase this proportion by the next survey. The best way to ensure we print what you want is to send in your own submissions!

Incidently the charts shown here were produced using one of BAU's own Graph application. It was written by Mike Curnow and appeared in BAU December '91 with enhancments published in this *INFO and a fully working

ECFs consists of eight bytes of data, rather like a user-defined character. In a two-colour mode, each row consists of eight pixels, so an eight by eight pattern is used to fill shapes. Once defined (using VDU 23,1+pattern number) they may be selected with GCOL 16*(pattern number) and all subsequent fills (as with CIRCLE FILL etc) will use the appropriate ECF. In four-colour modes, each row only defines four pixels and in 16-colour modes only two pixels. Of course, in 256-colour modes (as *Lines* uses) each ECF only represents a column of eight pixels, only one pixel wide.

This is where the Giant pattern becomes useful. The command GCOL 80 causes the four ECFs to be used side-by-side. In two-colour modes, this provides a fill pattern of 32 by eight pixels and the short demonstration *GiantECF* illustrates this. In 256-colour modes, a modest four by eight block of pixels can be defined (see our diagram on the previous page) and this is what Jan uses. An array pt% holds giant ECF definitions for various stages along the line. At one end, all pixels are clear; at the other all are set. Circles are plotted to form the line using the appropriate giant ECF as read from pt% and the pixels are regularly mixed up to keep the effect random.

AlienTree is an unusual and artistic example of the technique shown in *Lines*. A tree is plotted (in the traditional recursive manner) but each branch and sub-branch is made up of coloured line segments of the type used in *Lines*. Each sub-branch takes the end colour of its parent as its start colour and then changes to a random colour along its length. Finally, *Weirdo* is a strange offering we got from Jan a while ago and never got round to including. Someone nicknamed it *Madonna*, but I can't image why. You'll find a couple more of Jan's offerings on the June subscribers' disc.



Lines does it all with dithering

DODGY TROLLEY

We've received a handful of letters from people who have had problems with my automated shopping list program, *Trolley*. One particular letter came from **Alex Carroll**, who even supplied me with a sample file that seemed to be causing problems. There is, in fact, a minor bug in the program that will only come to light after using the program for a number of weeks.

We seem to have got confused over the size of the num() and date() arrays. These hold the dates of purchases and the number of items bought and are used to predict when you will run out of items. If you change all occurrences of the variable dates to dates-1 in DEF PROCcalculate except for the first 'IF dates=0 ENDPROC' and the i=dates-1 you should find that this will cure the 'subscript out of range' errors.

GRAPH PLUS £20

Here's a neat addition to Mike Curnow's graph plotting application from last December's issue. It comes from **David Waters** of Amersham. If you recall, the original graphs were described by a simple text file. David's additions allow two new commands to be used that let you highlight individual points with symbols. The update also allows linear least-squares.

Graph+ contains the lines that need to be added or changed in the original *!RunImage* as it appeared in December's yellow pages. As with all updates, please take care with line numbers. The full adjusted listing is also included in yellow pages.

Figure three on the opposite page is a simple graph showing off the new features and the text source for the graph. The new commands supported are used thus: `line,n` where *n* is 0 for no line (useful for just displaying the individual points), 1 for straight line segments (like the original program produced) and 2 for the least-squares fit (as shown in the example).

To provide highlighting symbols use: `symbol,s` where *s* is the symbol to be shown at each listed point: 0=none, 1=open triangle, 2=open square, 3=open circle, 4=filled triangle, 5=filled square and 6=filled circle. Circles are in fact 16-sided polygons to avoid the need for Bezier curves, but the results are more than satisfactory.

The new commands may be used in either order, or not at all and can follow the *newplot* command if you would like to draw several graphs using different line or point styles. A complete, updated version of *Graph* also appears on this month's disc.

£10 TIP OF THE MONTH

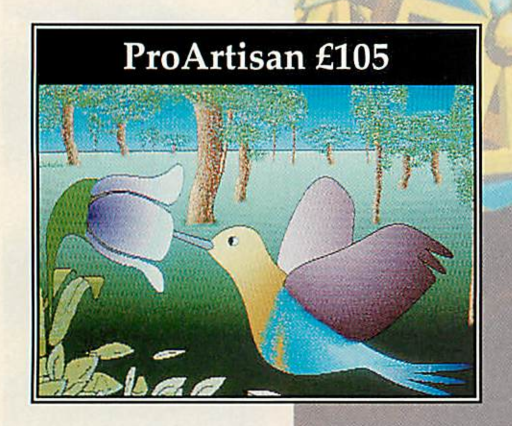
Here's a little cautionary tip from Peter Hanley. Many Risc OS applications make use of the MemAlloc module for allocating memory to the Ram disc, system sprites and so on. It provides a number of *commands to check and alter the sizes of these various 'dynamic areas'. However Peter points out that there is one very silly feature in this module, if you use a call such as:

*ScreenSize 160K Error 1 Can't claim 160K screen memory

It seems to work okay in modes which use less than 160K, but any bigger modes and the error is generated! Unfortunately there seems to be no simple way round this problem—you must either enter a suitable mode before running the application or, as Peter did, write your own version of MemAlloc!

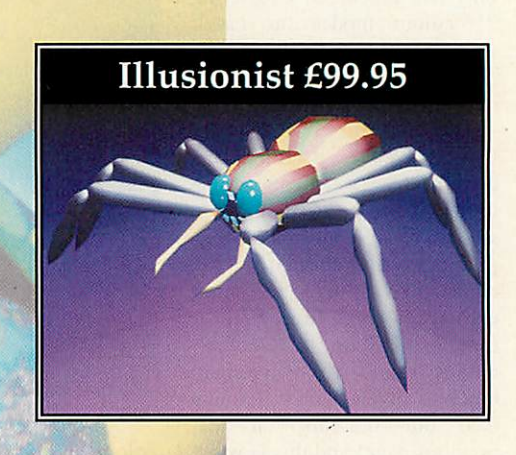
Peter also points out that Risc OS 3 does in fact have a similar call built in, *ChangeDynamicArea however, this can only change the size of the system sprites, the Ram disc and the font cache.

GRAPHIC PROGRAMS TO BRING LIFE TO YOUR PICTURES



First there was the *Artisan* and *ProArtisan* series – still the most widely used art packages in education today. They feature an intuitive icon based menu system that has proved usable by children as young as three years old. Yet they are powerful enough to be used by serious artists.

Artisan is in its second generation *(Artisan II)* and provides many useful and unique features. This is the one for younger children and anyone interested in textile design. ProArtisan is a more sophisticated package but retains the familiar interface of Artisan II – an easy upgrade path.



No, this isn't a bird eating spider and no *Illusionist* doesn't replace *ProArtisan*. *Illusionist* is a graphics package for those who don't have the skills or inclination for free format painting.

With *Illusionist* you create a wire frame outline of your image using pre defined shapes. In addition you can define your own shapes or distort any existing shapes. This makes it very easy to generate images even if you can't draw a straight line. You can assign colours and textures to your objects. You can even give them texture maps. A texture map is any Mode 12 or 13 screen. So you can use a scanned or digitised image, a painting – literally anything!

Render Bender II £99.95

NEW REDUCED PRICE

Render Bender II is another top rated graphics package from Clares. Images are created in a similar way to *Illusionist* by defining objects using pre defined shapes. You then add colour, texture, lighting etc. *Render Bender* images can include glass and mirror objects as well as shadowing. *Render Bender* actually calculates the path of light from its source to the imaginary eye at the viewing position. This path takes account of any reflections and refractions.

In addition *Render Bender* can create animated sequences very easily. You can either give objects a formula to control their movement or you can give start and end positions and ask the program to 'in between' the other frames. The result is a stand alone animation that can be passed to friends or even sold.

Titler £149.95

This shows a graph from !Plot loaded into Titler.

We can have Rubout boxes

Underlined text

Finally we have *Titler*. This is a video titling and sequencing package. The *Titler* program uses outline fonts enabling you to create text screens, credits etc. You can have any colour text, background, drop shadow, underline or rub out boxes. You can also include sprites and Draw files in your screen.

The *Titler* screens can be used in the *Sequencer* program along with screens from *Artisan, ProArtisan, Illusionist* and *Render Bender*, as well as lots of other formats. You can also include *Render Bender* or *Euclid* animations, *Tracker* tunes, *Armadeus* samples or Archimedes samples in your sequence. *Sequencer* gives you total control over the display of the screens and provides many effects to switch from one screen to the other. As well as being a tool for video titling this package can be used purely as a presentational tool for preparing and showing lecture notes, demonstrations etc. In fact all of Clares demos are now created using *Titler* and *Sequencer*. *Please request a demo disc that will illustrate the potential of these packages.*

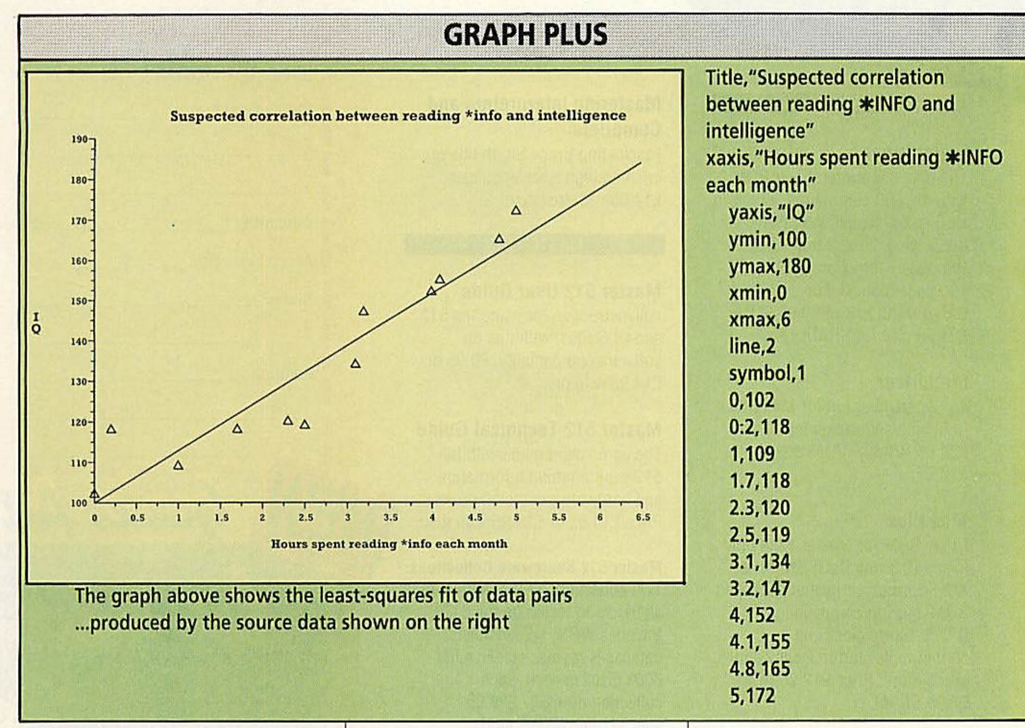
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GRAPH PLUS



The graph above shows the least-squares fit of data pairs ...produced by the source data shown on the right

```
Title,"Suspected correlation
between reading *INFO and
intelligence"
xaxis,"Hours spent reading *INFO
each month"
  yaxis,"IQ"
  ymin,100
  ymax,180
  xmin,0
  xmax,6
  line,2
  symbol,1
  0,102
  0:2,118
  1,109
  1.7,118
  2.3,120
  2.5,119
  3.1,134
  3.2,147
  4,152
  4.1,155
  4.8,165
  5,172
```

SQUEEZE II £20

Regular readers should remember last month's opening feature in *INFO – **Brian Cooke**'s A5000 *SquashUtil*. He has now finished the extra code needed for saving squashed data and as promised, we can now publish the additional lines. If you turn to the yellow pages, you will find Brian's complete program.

If you have already typed in his listing from last month, you can use this as the basis for typing in the new listing. There are a couple of extra lines before line 240; the EQUS "Save" and EQUB 0 at 620 are new, as is the B SWI_save at line 940. The new code starts at line 3100 and finishes at the end of the program. The entire progam can, of course, be found on the monthly disc.

These extra lines of code will add one new SWI call to the *SquashUtil* module, Squashed_Save. With this call, you can save a block of memory in much the same way as with OS_File 0 or *Save. The only difference is that it is compressed on the way! Four parameters should be supplied to the SWI, and a typical call might look something like: SYS "Squashed_Save", "MyFile", buffer, buffer+length, "Data"

The first parameter (R0) points to the name of the file, the next two (R1 & R2) point to the start and end of the data in memory, finally R3 is the filetype. This can be a pointer to a textual filetype name as above, or alternatively it can be a pointer to a bit numeric filetype (such as &00000FFD) or zero.

If this is the case then the file is left untyped and the load and execution addresses are set to where the file was saved from. The actual file created will have type &FCA (*Squash*) and can be unsquashed either with Acorn's *Squash* utility supplied on the applications disc or with the Squashed_Load call also supplied by Brian's module. (For example, SYS "Squashed_Load","MyFile",address). For more details of this and Squashed_Info, please refer to May's *INFO.

Given that machine code is not always that easy to follow, Brian has supplied a version of the squash routine in Basic. When run, *CompDemo* prompts for input and output filenames. The input file is loaded into memory and squashed using the same technique as the module and saved to the output file.

For your reference only, a number of variables are printed during the squashing process so you can see how well it is doing. Brian's description of how this works is shown below, followed by a summary of the SWI calls provided by the Squash module.

"Module Squash_Compress is called once near the start of the program, to find out how much workspace the SWI needs (this is with bit three of R0 set). The source file is then read into memory, OS_File 11 is used to create an empty, time-stamped file of type &FCA (squashed). This is then opened for output and the standard 'squash' header written to it. This consists of five 32-bit words.

"The first contains the Ascii codes for the letters SQSH and is used for identifying squashed files. This is followed by the length, load address and execution address of the original file. As with all file addresses, if the top 12 bits of the load address are set, then the load and exec address should be interpreted as a file type and time stamp. The final item in the header is a flag word. Currently these should all be set to 0, to allow for future expansion. The squashed data starts 20 bytes into the file.

"The actual squashing is performed by the REPEAT... UNTIL loop. Squash_Compress is the call that does all the hard work although, in general, it is a lot easier to use and explain than the corresponding decompression call. The register R0 contains flags. Bit 0 is set if there is any more data left. In this case there isn't – we are giving the call the whole source file at once. Note that this doesn't mean that we are only going to use the compression call once to squash all the data – we set this bit to inform the call that all (remaining) data is available now – we are not secretly holding on to any!

"Bit 1 should be set if the call continues to use the contents of its internal workspace. Therefore this is clear the first time the call is used and set thereafter; R1 points to this workspace (as claimed in the set up routine); R2 and R3 describe the source data, R2 points to the next byte to be squashed and R3 says how many bytes are left to squash. Similarly R3 and R4 describe the output buffer, R3 points to it and R4 says how big it is.

"The call returns a number of things and four of these are useful to us. The register R0 is a status byte, usually 2, meaning that the operation ran out of output space. But this will become zero when all the data has been squashed. R2 and R3 are updated to point to the first unsquashed data byte and the number of unsquashed bytes respectively – these can then be passed to the call the next time round. R5 returns with the number of bytes left in the output buffer. If subtracted from the size of the buffer, this gives the number of squashed bytes 'created'. These should then be written to the output file. This loop should be repeated until a status of zero is returned. The output file is then closed."

Brian points out that for some reason the files created by Squashed_Save are not always the same length as those squashed with *Squash*. However, both sorts of file are uncompacted successfully with either Squashed_Load or *Squash*, with no data gained or lost – can anybody throw any light on this matter?

Brian says that the module is undergoing a few minor tweaks to provide some *commands to access his SWI calls. He also says he is working on a 'transparent' version that will work in much the same way as *Compression* or *ArcFS* although he freely admits that he doubts if it will ever be finished!

To round off then, here are Brian's own descriptions of – two of the most complex calls



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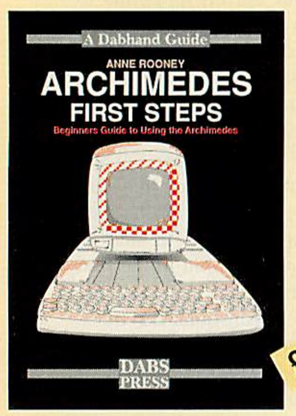
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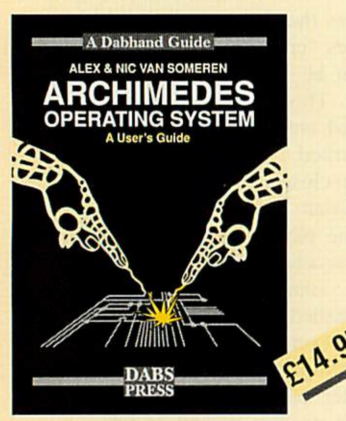
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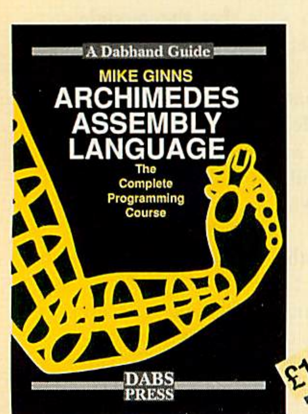
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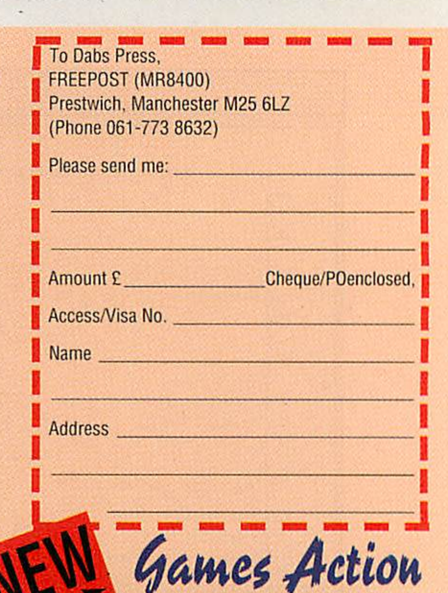
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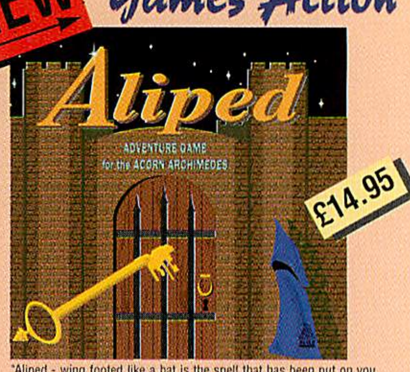
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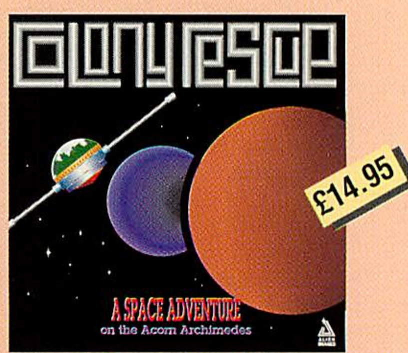
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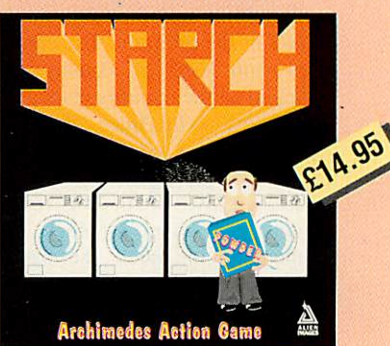
Games Action



"Aliped - wing footed like a bat is the spell that has been put on you by the evil step-mother of your fair princess Natasha".
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provided by Risc OS 3 Squash_Compress and its converse call, Squash_Decompress.

Squash_Compress compresses data. Both input and output can be viewed as streams, meaning that neither need to be held in memory in their entirety at any one time. The call returns if it runs out of data in either the input or output buffers.

"Register R0 contains flags: bit 0; clear to start a new opertaion, set to continue the operation using the existing workspace contents. This must be claimed before the call can be used 'for real': Bit 1; clear if there is no more input data, set if there is. 'More' means that the current input buffer does *not* contain the entirety of the data. Bit 2 is reserved and should be zero (as should bits 4 to 31). If bit 3 is set, then the call returns information about buffer sizes given an input size in R1.

If this is the case, the call returns with R0 containing the address of the workspace needed and R1 set to the maximum output buffer size.

"Moving on, to squash data, R1 to R5 need to be set as follows: R1 points to the workspace, R2 points to the next byte to squash, R3 contains the number of bytes of input available (data between R2 and R2+R3 is to be squashed). R4 points to the output buffer and R5 contains the number of bytes of output available. After the call, if bit 3 of R0 was clear, then it is updated to contain a status byte. A value of 0 means the entire operation has been completed and all input has been squashed: 1 means the call ran out of input data: 2 means the call ran out of space in the output buffer. R1 is preserved, but R2 to R5 are updated as follows: R2 points to the next byte to squash, R3 contains the number of unused input bytes. R4 points to the first unused byte in the output buffer and R5 contains the number of unused output buffer bytes.

"If the output buffer is definitely large enough and bits 0 and 1 of R0 are clear on input (meaning that the entire input data is available) a special algorithm is used by the call that is nearly three times faster than the 'buffered' version. Squash_Decompress is the complement to the above call. All the parameters to the call are currently the same, except for bit 2 of R0 on input. If this is set to 1, the call assumes that all the output will fit in the buffer specified by R4 and R5 and a faster algorithm will be used. Unsquashing is about twice as fast as squashing and the fast algorithm is nearly six times faster again!

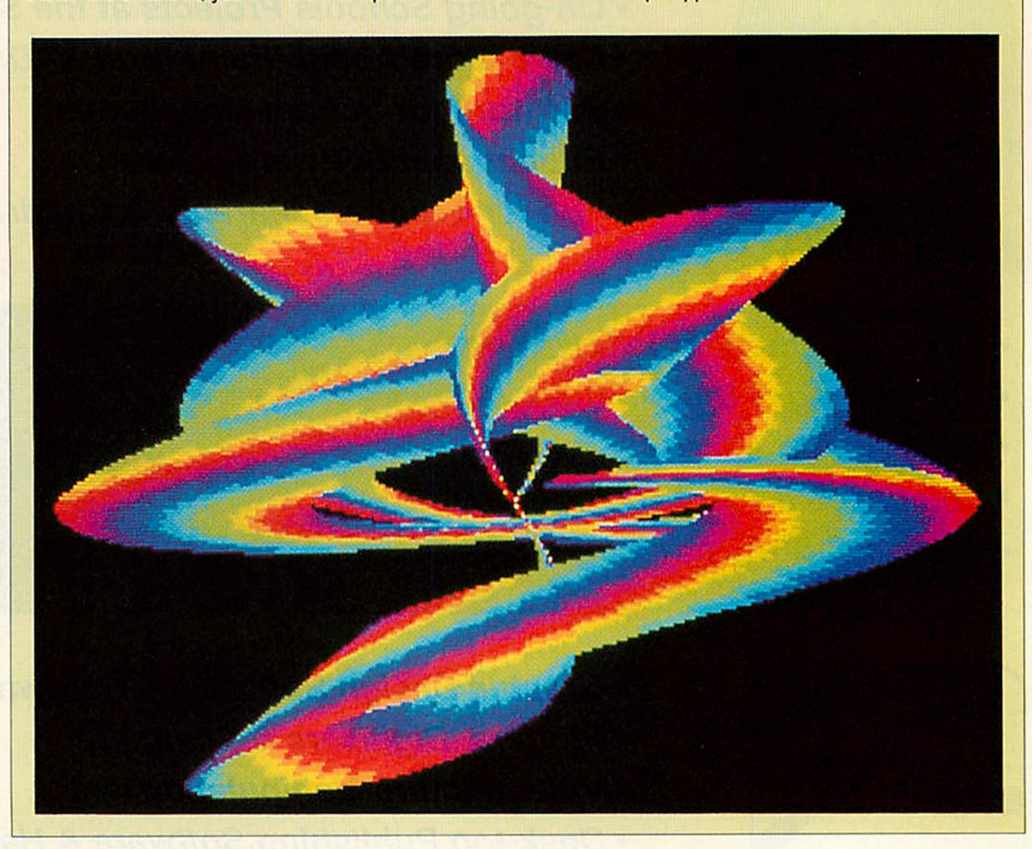
"If the call ran out of input data (status 1 returned and R3<12) then the unsquashed data must be supplied again on the next call. If you look at my demo last month, or in the code for .SWI_Load, you will notice that it sometimes copies a number of bytes from the end of the input buffer to the start before loading in some more bytes."

One final note: the current implementation of the call cannot predict how big the final data will be. This means that -1 is always returned in R1 when the SWI is called with bit 3 of R0 set.

*DISC

As always, there are two ways to get your hands on the *INFO programs. They can either be copied in from our yellow pages or loaded from the subscribers' monthly disc (see page 89 for details).

And, as usual, there are a few extras to be found on this month's disc. From Jan Vibe, StarCross and Rainbow should serve to entertain 32-bit users. For Master owners there's a short planetary demonstration from Adam Scott. And of course, you'll find the complete revised version of the Graph application.



COUNTDOWN £20

B B M C E A At the time of writing this, my all-time favourite TV show, *Countdown*, has finished its latest run on Channel 4. Clearly many *BAU* readers are also fans and following our Arc 'numbers game' solver back in the March issue, **Richard May** of Bristol has sent in a Basic program that does the same job on all machines.

For those not familiar with the game, six numbers are chosen from a selection of 25, 50, 75, 100 and 1 to 10 and a random target figure must be reached by combining some or all of them with +, -, * and /.

CDown uses, in the words of its creator, "an intelligent/heuristic approach to solving the problem. Even when running on a BBC B it can often outpace the Archimedes solution."

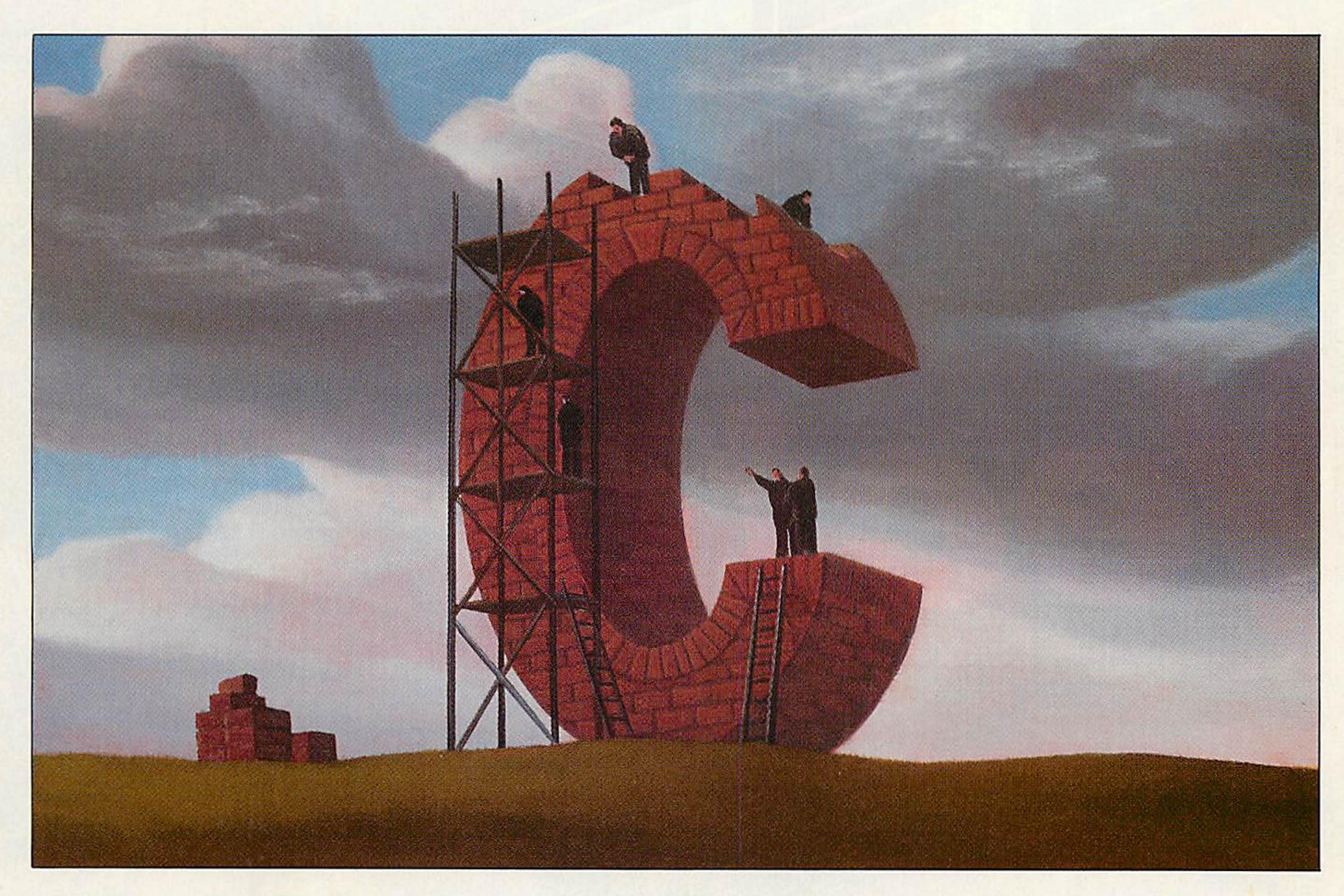
Enter the six small numbers and the target then select a quick or full search as desired. The nearest solution that is found will be displayed.

The heuristics cannot guarantee to find a solution. Indeed there may not be a solution, as was proved in the last series when Cecil (the random number generator on the programme) chose a total that was larger than the highest possible combination of the selected numbers. However, Richard's program, GOTOs and all, is an admirable demonstration of how the Beeb can tackle such a tricky problem.

*QUIT

Please send your submissions to us at; *INFO, *BBC Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. All but the shortest of programs should be on disc and accompanied by a brief description of their purpose and operation. A stamped addressed envelope with your submission will ensure the return of your disc.

Dave Lawrence
Dave Acton



C FOR YOURSELF

In the first of a new series Dave Acton introduces C, the high flier of programming languages

The idea of writing a multi-tasking Risc OS application can appear very daunting the first time you attempt it. There are so many things to consider – menus, windows, loading and saving, messages from other tasks and so on. Before you know it, your simple Basic program is 1500 lines long. And runs like a drain. So what's the alternative?

Well, Acorn recommend C as *the* development language and when it comes to writing desktop programs, C has more than one advantage over Basic. This article has two real purposes – to give non-C programmers a glimpse of what the language has to offer and to encourage those with a little more experience to try their hand at writing Risc OS applications.

Over the next two months, we will be building up just such an application. *Timely* – a diary/calendar/year planner will be the end result, a useful program in itself and also a convenient vehicle for illustrating the basic concepts of C.

BUT WHY C?

C programs run much quicker because they are compiled into machine-code. If you have something complicated to display in a window, you'll really notice the difference. But, better still, writing applications in C is actually *easier* than in Basic. A vast library of ready-to-use procedures means than there is often a call to do exactly what you need.

A CRASH COURSE

C programs are written as text. Many features are similar in appearance to Basic,although plentiful supplies of curly brackets are compulsory. These text files are then compiled by the C compiler, a program that is usually called *cc* and held in your library. Although the compiler produces a machine-code version of your program, you cannot use it immediately. Instead, it's stored in a directory called *o,* as a special sort of file. This contains details about your program and the compiled code itself.

Another program called the *linker*, generally called *link* in your library, takes this special file and links it with any others it might need to produce the final program. This is the version that you can run. The reason for the linker is that you can include bits of other programs in your own creations.

So, the purpose of the linker is to go away and find all the different bits that your program uses and include them as appropriate. All you need to do is tell the linker where it can find these programs and use the command include in your

text program, with some details. Thanks to this facility C programs can rely heavily on libraries.

There are standard libraries, usually held in *$.CLib* and these include mathematical functions, string functions and standard input and output routines which are common among all versions of C. You include them in your program with the directive #include. This command can also be used to incorporate your own libraries of routines as well as those supplied with the C compiler.

C is clever, in that any libraries you include needn't be recompiled with your program. Instead, you include a *header* file (found in directories called *h*) which simply lists all the pre-compiled functions and the parameters they expect. The linker then includes the necessary code in the final image.

Another program called the *make* utility is used to wrap up the whole process of compiling your C program into one neat file. You simply describe how to compile your program in a simple text file and the make utility takes this file and processes it intelligently. The clever thing about make is that it will only compile or link those components of your program that have changed. For example, you might have a program *c.myprog* which includes a library $.userclib.c.lib. If you only change *c.myprog* the make utility will realise this and won't bother recompiling $.userclib.c.lib as well. We'll see more of make in the months to come.

C FEATURES

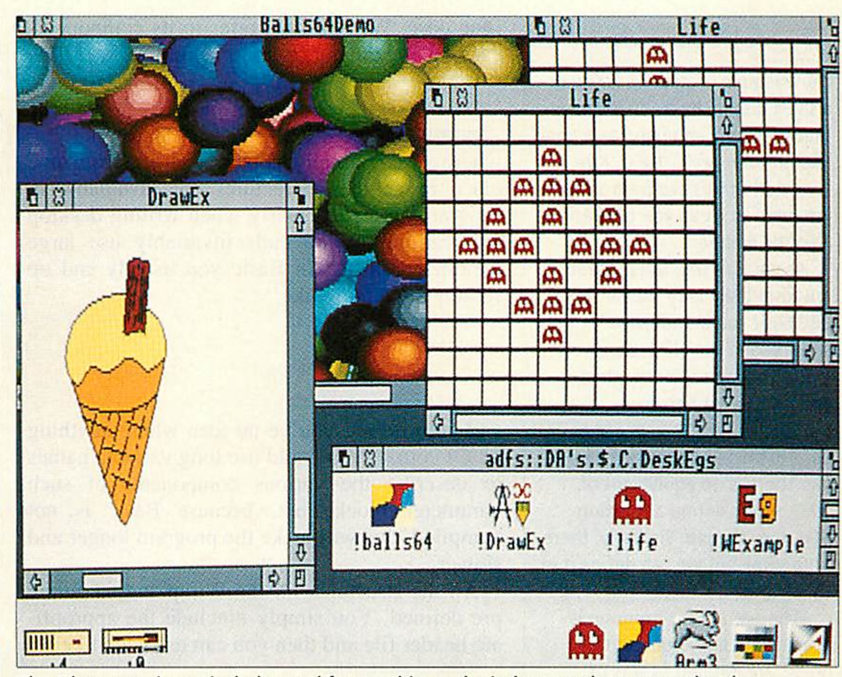
There are certain key features of the C programming language that distinguish it from others like Basic. Two of the most important ones are structures and pointers.

Let's deal with structures first. In Basic, you are limited to certain variable types, or *cases* as they are called in C. You can have integers, floating point numbers, strings and that's about it. You can build arrays of these types, but you can't define new ones. It is rather like building a housing estate with only a few fixed house designs. You can build a street of one type, as with an integer array, but you can't mix and match types.

C is more flexible. You have the standard cases int (integer), float (floating point), char (character) and so on, but you can also define your own cases, either as copies of the standard ones or combinations of them. Such combinations are called structures. So, returning to our housing example, not only can you create your own house designs but you can group these together however you like, so your Basic street of identical semis could be replaced by a C street of bungalows, skyscrapers and whatever else you fancy.

Sometimes new cases are used just for clarity. For example, font handles have their own case in Risc OS. This is defined with the statement typedef int font; which means that you can initialise the variables like this: static font title;

The variable title is just an integer, but because the new case is described as font this makes its purpose clearer. Cases don't just make programs prettier though – they are also invaluable for debugging purposes. The clearer you are about the nature of a variable, the easier it is for the



The C language is particularly good for graphics and windows as these examples show

compiler to spot mistakes when you use a variable out of context. For example, if you have an *int* variable i and assign it the value of a *float* variable f with i=f; the compiler will warn you that you're throwing away some precision. You must tell the compiler that you really know what you're doing by *case converting*. This means including in brackets the case you want to end up with. In this case you would use i=(int) f; and the compiler then lets it through.

It's when you start combining different cases, that the versatility of C becomes apparent. As an example, look at the structure of font_desc in the figure below. It's taken directly from a library called FontUtils which we'll be using when we create our application next month. It's a good example of structure because it has just about everything in it.

The first element in the structure is an array of characters called name. Strings only exist in C as character arrays, which is a bit of a bind when you're used to Basic, but no real hardship. In this array is stored the font name (Homerton.Bold.Oblique or whatever). Next is handle which is of type font. As I said earlier, this is just an integer but using font rather than int makes it more readable and it will still compile should the definition of font be changed.

The type draw_fontref is defined in the library drawftypes.h which provides many types for manipulating draw files. We include a variable no of this type in our structure, in case we wish to use the font in a *Draw* file (as indeed we will next month). Next comes an integer id which is sort of a user-handle to do with as you like. Then two double-precision floating point variables xpt and ypt define the font size. Finally, two more character arrays are included to contain user-supplied font sizes.

The beauty of using this structure is that a single variable can be used to refer to the whole set of mixed variables. Because the structure is defined with typedef, it is not a one-off affair but can be used as a case (just like int). So the line: font_desc title; defines an object, title, of type,

BUYER'S CHOICE

Before you can get going in C, you will need to buy a copy of the C programming language. Acorn's own version of C – also known as Norcroft C – remains the standard. Release 3 marked a great step forward in ease of desktop programming and now with release 4 things are easier still. All of my examples and the application that will follow next month are suitable for Acorn C, release 3 or later. Release 4 costs £229 plus VAT. Contact Acorn on (0223) 245200

Beebug also provide their own C compiler with libraries that are nearly identical to Acorn's. It's undergoing something of a service at the moment and a new version is expected to appear at any time now. We will of course, let you know of any changes that relate to these programs. This costs £77.39 plus VAT. Contact Beebug on (0727) 40303.

We would also recommend that you buy an introductory book on programming, such as *A Book on C* by Al Kelley and Ira Polley (ISBN 0-8060-4)

CASE STRUCTURE

```
typedef struct {
  name[48] ;
  font handle;
  draw_fontref no;
  int id;
  double xpt,ypt;
  char user_size[8];
  char user_height[8];
} font_desc;
```

C IN ACTION

Our example program *BasKite* is a short doodle by Andy Gibbons that originally appeared as a one-liner in February's *INFO. *Kite* is a C version of this program and is intended to wean you off Basic in a gently manner.

As you can see, the programs are essentially very similar. Many BBC Basic commands are mimicked in the bbc.h library. So MODE 4 becomes bbc_mode(4) and CIRCLE x,y,r becomes bbc_circle(x,y,r). Others can easily be constructed, as in the example. There is no equivalent of WAIT, so we define a function that does the job. Similarly, there is no SWAP but we can define it in three lines.

Whereas a Basic program is executed in line order, C programs are defined as sets of procedures, with one main procedure which is always called main(), forming the entry point of the program. We define procedures that main() will use before main() itself, so they are recognised without the need for extra declaration lines.

All variables must be declared in C, either at the top if they are global or at the start of a function if they are local. This ties in with cases, as we will explain later. If you'd like to compile the example, save it in a directory ($.MyProgs.C for example) and enter and save the obey file *MakeKite* in $.MyProgs also. You will need to create a directory $.MyProgs.o to take the intermediate object code. Run this obey file to create the program *Kite*. You'll certainly notice a difference in speed between C and Basic.

The following commands are what you need to type in, to turn the textual C program into machine code.

```
cc kite -c -i$.risc_oslib
link -o kite o.kite
$.risc_oslib.o.risc_oslib
$.clib.o.stubs
```

font_desc. We can then refer to its components easily using the dot operator as follows:

```
title.xpt=4.5;
title.ypt=5.6;
strcpy(title.name,"Trinity.Bold");
```

where strcpy() simply copies a string from one place to another. Structures are invaluable in programming particularly when writing desktop applications. Wimp calls invariably use large parameter blocks. In Basic you usually end up writing something like:

```
!q%=handle%
q%!4=x0%
:
q%!72=...
```

and before long you've no idea where anything is! Of course, you could use long variable names to describe the various components of such parameter blocks but, because Basic is not compiled, this will make the program longer and slower.

All the structures for the Wimp and so on are pre-defined. You simply #include the appropriate header file and then you can use code like:

```
window->w=handle;
window->info.box=newbox;
```

To a Basic programmer this may seem as unfriendly as all the q%s above, but in the long run it actually makes life easier.

POINTERS

Another key feature of C is the idea of *pointers*. Basic supports them to some extent with the operators ! and ? for example:

```
DIM a 16
b=a
!b=14
```

Here the variable b is a pointer, containing an address rather than a value. At that address is placed the integer 14. In C, b would be defined thus: `int *b;`

Unlike Basic, C takes a more rigid approach to pointers. Addresses are not vague entities that can refer to anything – a character, a string, or an integer. The pointer b is expected to point to where an integer is stored and unless you specify otherwise, you will only be allowed to store integers at or read integers from b.

Pointers to structures are particularly useful as they enable you to pass descriptions of things easily from one procedure to another. Remember our font called title? Well, we could set up a pointer to it like this: `font_desc *p=&title;` and use this when referring to our font. There is a procedure in FontUtils which takes a pointer in this way and sets up a font descriptor block. It's defined as: `font_utils_declarefont(font_desc *d,char *name,float xpt,float ypt);`

The routine takes a pointer to font descriptor block, a font name and size and attempts to locate that font. It then stores details of that font (or the closest it can find) in the block pointed to by d. This use of pointers is specifically known as *call by reference* and the technique allows procedures to take parameters and alter them in some way. In the example *Kite*, call by reference is used. Have a look at the routine swap which emulates the Basic SWAP command. Normally when you pass, say, an integer to a procedure, it takes a copy of the value and uses that. However, if you pass the address of an integer instead, the procedure knows where the value of that integer is stored. It can look it up and indeed alter it and swap does this, taking the addresses of two integers (& means 'address of') and swaps their contents (* means 'contents of') rather like Basic's ! operator.

Although C functions can ret.purn values, like Basic ones, often pointers are used to alter variables. Not only can you alter more than one variable in this way but, when you have to deal with complicated structures like font_desc, it is far easier to refer to them by their address than by their value.

NEXT MONTH

A good habit to get into is to compile those parts of your application that might come in useful elsewhere as separate files. This idea will be put into practice with *Timely*.

As well as the main program, several libraries will be presented which I hope you might use in your own programs. FontUtils will provide a friendly way of declaring and using fonts and creating Impression-style font menus. DrawUtils will ease the creation of *Draw* files whereas WimpUtils will take some of the effort out of keeping track of your windows and icons.

So, C you again next month...

C AND THE WIMP

There's a big difference, you might think, between writing a simple stand-alone program and a full-blown multi-tasking application in C. Well, yes there is, but the standard Risc OS C libraries help to make the job simple. Acorn's version of C includes example applications, showing you the official way to do various tasks, like saving, displaying draw files, handling icons and so on.

The awkward thing about multi-tasking is that programs aren't executed linearly. You never know what the user might do – click on an icon, bring up a menu, drag a file – you can't predict which parts of your code will get called when.

In C things are simpler as many of the Risc OS functions work on the idea of handlers. A handler is any routine that you have declared capable of performing a given task. One example is a menu handler. When you create a window, you can attach menu handlers to it. So, when the user clicks on it with Menu your menu creation routine is automatically called.

Similarly, when the user selects an item on the menu, your menu select routine is called. Different menus can be attached to different windows. Icon bar menus are recognised as such and brought up at the right height on the screen.

Another good example is the saveas() function. This provides a standard save box. Again, you simply supply handlers to do the saving. You don't have to worry about the dragging of the save icon, clicking on OK, or typing a name and pressing RETURN. You are told that the user wants to save a file – you save it, and that's that!

And, because such standard routines as saveas() are provided, there is the added benefit that your application will be consistent in its behaviour with others written in C.

We will be covering at all of these issues in more detail later on in the series.

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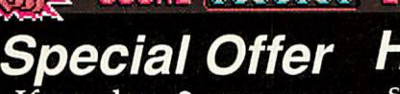
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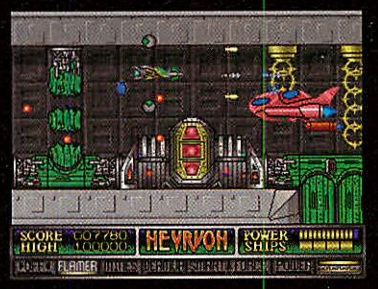
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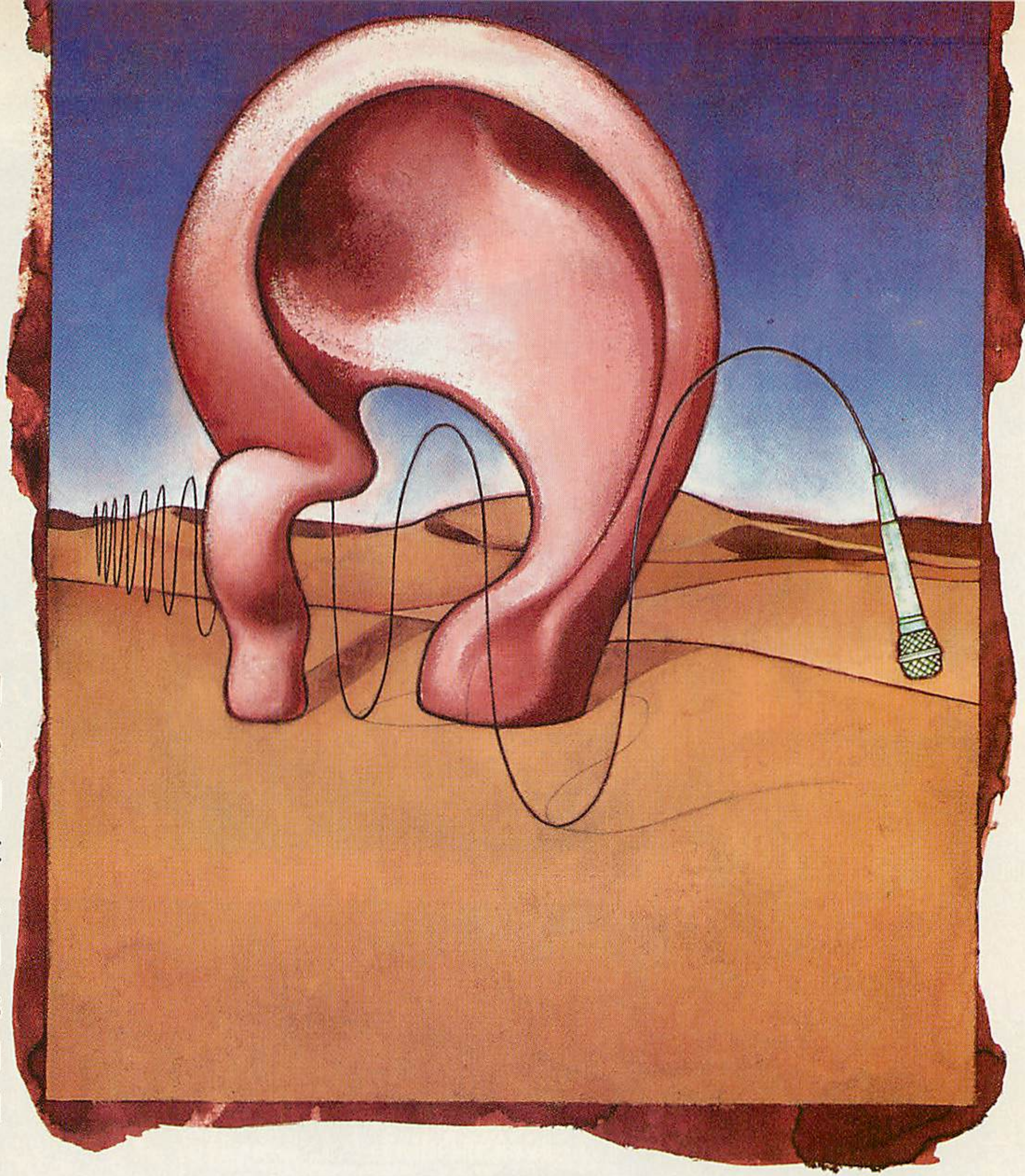



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Bells, whistles and even explosions are among the sound effects that an Arc can produce. David Radford starts a new series on the theory and practice of sound

WIRED UP FOR SOUND

Although the Archimedes has good facilities for sound, many users fail to take advantage of them, either because they don't understand the subject, or because they lack experience of machine code. Yet sound is a worthwhile addition to many programs, whether they be educational programs with added speech or weird and wonderful noises to liven up your games programs.

This series of articles will, among other things, show that it is possible to produce a variety of sounds from Basic and we will be providing you with all you need: both the knowledge and the necessary machine code routines. But, first of all, it is important to understand the nature of sound itself...

By definition, sound is a physical vibration, transmitted through the air and detectable by the ear. When an object such as a plucked string starts to vibrate, it disturbs the air molecules around it, setting them in motion. The movement is passed from one air molecule to the next in the acoustic equivalent of a Mexican Wave. This is, in effect, a sound wave.

Sound waves cause the sensitive membrane of the eardrum, and the tiny bones beyond it, to vibrate, making it possible to hear sound. A computer can 'hear' using the electronic equivalent of an eardrum – in other words, a microphone, that converts sound waves into electric currents.

These currents can be stored on to a tape recorder for later use but a computer works using numbers rather than currents. So, to record sounds from a microphone on an Archimedes, these currents must be converted into numbers representing the strength and direction of the current. This job is done by a piece of hardware known as a sound sampler.

A sampler works by measuring the strength of the current from the microphone at a certain instance in time. This current is constantly changing so, if the sampler takes two measurements of the current one second apart, then all that is reliably known about the current during that second is its strength at the start and end of that period. It follows then, that the two measurements (or samples, as they are known)

have to be as close together as possible, thereby causing a dilemma. Each sample requires one byte of memory and so, if there are twelve bytes available, samples taken one second apart would give a period of twelve seconds. Or a more accurate series of samples, half a second apart, will last for only six seconds. As you can see, it is a case of quality versus quantity.

The length of time between two successive samples is known as the sample period and is usually measured in microseconds (millionths of a second, which is written as 'µs' or 'us'). With some commercial programs you may come across the term 'sample rate', and this is the number of samples taken per second. This is measured in Hertz (Hz) or thousands of Hertz (kiloHertz or kHz).

Of course, for a sound sampler to be of practical use you need to able to playback these recorded sounds. Luckily, all Arcs and A3000s have built-in hardware to do this. But while this is all very well, the sampler does cost money, anything from £30 to £150, and this can dissuade many people from dabbling in this fascinating subject.

The good news is that you don't have to buy a sampler to play around with sound. Remember that we said that sampled sounds are made up of a series of numbers? Well, it is perfectly feasible to write a program that can make up these numbers from a set of simple rules. This technique is known as sound synthesis.

MAKE A SOUND

There are many different ways of synthesizing sound and the music industry is coming up with new ones all the time. Many of these are complicated, and most can only produce certain types of sound. Among these techniques are various types of modulation and harmonics, but for the first of these articles we chose a very simple approach. There are a few basic sound waves that often form the basis of synthesis routines – the sine wave, the triangle wave, the square wave and the saw-tooth wave. The program *Wave* can produce sounds from any of these wave forms. (See the Making Waves box above to find out exactly how to use the wave program and our *BAU* Program box, on page 68, for details of how to obtain the program.)

Note that you don't have to limit yourself to samples created or supplied with the *Wave* program. Any sample that conforms to the *Armadeus* format can be played back and we have provided a few on the subscribers' disc for you to try: simply choose the Load sound option and type in the filename of the sample – ours range from a grand piano to sounds of the Starship Enterprise. Bear in mind that these wave forms are too complicated to show in the wave box, so you will only hear the sounds.

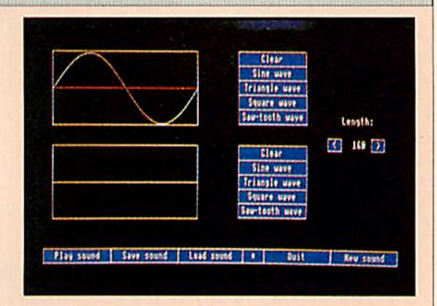
We have also supplied a public domain program called *DSEdit* on the monthly disc. This can be used for editing sound samples. However, the format used by *DSEdit* (linear unsigned) is not the same as the *Armadeus* format used by *Wave* (linear signed). So, to allow you to convert from one format to the other, we have included another public domain program called *SampConv*. For more details on the most common formats read our Sound Formats box on the left.

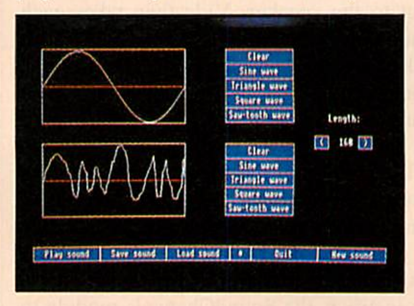
TIME TO PLAY

So, once you have your sound sample, how is it output to the speaker? Well, sound is handled by the Vidc chip and what happens is this: Risc OS supplies Vidc with two buffers (temporary areas

MAKING WAVES

Our first listing in the yellow pages, called *Wave*, lets you play with various sound waves. When you run it, you will be presented with two boxes, each with a cluster of icons down the right-hand side giving the four basic waves. Ignore the bottom box for the moment and click on one of the icons next to the top box. The wave you selected will then be placed into the box next to it. To listen to it, simply click on the Play sound icon at the bottom of the screen. For example, in our screenshot opposite we chose to listen to a basic sine wave. When you have played around with the four basic waves, try holding down Select over the top box and drawing your own waves. Again you can listen to it using the Play sound option. Use the Length arrows to alter the time of playback. Once you have created a simple sound, you can save it on to disc by clicking on the Save Sound icon at the bottom of the screen and typing in a filename.





You may be wondering by now what the bottom box is for. Well, the top box represents the sound at the start of playback while the bottom box shows the sound at the end of playback. Try clicking on one of the icons to the right of the bottom box or drawing in the box itself as shown on our screenshot. When you play the sound now you should be able to hear one sound changing into another. This is a simple technique known as interpolation, and is a term more commonly associated with computer graphics. In fact, several techniques used for graphics, such as scaling shapes and drawing straight lines between fixed points, come in useful for processing sound.

SOUND FORMATS

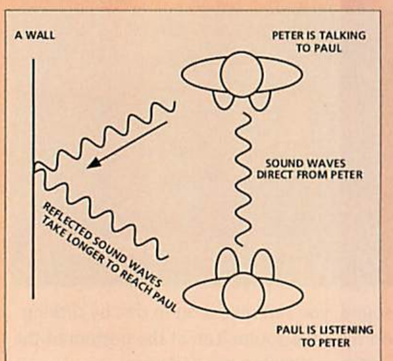
There are three basic formats for sample data: linear signed, linear unsigned and logarithmic.

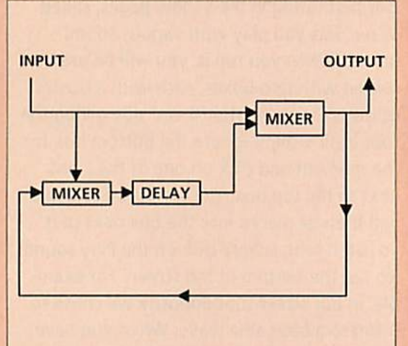
- Linear signed data is a twos complement representation of the number. That is, values from 0 to 127 represent actual values 0 to +127, and values in the range 128 to 255 represent actual values -128 to -1. *Armadeus* format samples use this type of data and this is also the data type recognised by our *BAU* program, *Wave*.

- Linear unsigned data is the type that is produced by most sound samplers. Values from 0 to 255 represent actual values – 128 to 127, with 128 representing 0. This format can easily be converted to linear signed by EORing it with 128. (ie. signed=unsigned EOR 128.) The PD application *DSEdit* uses this format for its samples.

- The third type of data is logarithmic (also known as Vidc) and this is the format required by the sound hardware of the Archimedes. It is slightly more complicated than the other formats, making use of a scale more appropriate to the human ear. There is a table maintained by Risc OS for converting from linear signed data to the logarithmic format, which is often used by voice generators.

ECHO BEACH





A real echo is caused by the fact that the sound has to travel further, creating a natural delay (see above left). In simulated sound, as in our *Echo* program, a delay can built into the program to mimic the natural echo as illustrated in the diagram on the right.

of memory) full of sound data in a form ready to be output to the speaker. Vidc then takes each byte in turn from the first buffer and sends it to the speaker at a predetermined rate. During this time, the Arc is free to be getting on with something else, such as managing the desktop.

When the first buffer becomes empty, Vidc starts using data from the second buffer. At the same time, the computer stops whatever it is doing and starts executing a piece of machine code in the SoundDMA module. SoundDMA works out which buffer has just become empty, and then instructs the SoundChannels module to fill it up again with new data.

SoundChannels does this using some software known as voice generators which provide sample data or synthesis routines for filling the buffer. There are nine voice generators already built into the Archimedes, (type *voices to find out more) and there are facilities provided by the SoundChannels module for adding your own, which is exactly what the playback routine does.

All voice generators have to be written in machine code for speed, so if you can't write in machine code then you can't write your own voice generators! However, we have provided all the code necessary for playing back a sample within *Wave*, in the procedure PROCassem.

If you want to use this in your own program you can safely delete the lines from .drawwave to just before .playback, as these lines are only needed by this particular program. Have a look at PROCplay to see how to use the code.

SPECIAL EFFECTS

So now we can now make some fairly crude sounds and play them back. But you can do much more with samples than that. Once you have created a sample, it can be altered in various ways. Echo is a fairly simple effect to add and is supplied in programs such as *Armadeus* and the public domain program, *DSEdit*. The second listing in yellow pages, called *Echo*, is a short routine to add echo to any sample created by listing one.

Simulated echo is based on the fact that sound travels at a fixed speed. For instance, if Peter is talking to Paul in an enclosed space, then Paul will mainly hear sound coming directly from Peter. However, a small amount of sound will bounce off the walls and reach Paul that way. So the sound waves arrive at Paul after different lengths of time, because of the different distances they have to travel. The result is that Paul hears the main sound, followed shortly afterwards by a fainter echo from the walls. This echo itself will bounce around the room, and arrives again at Paul some time later but much fainter and so on, until the echo becomes too faint to detect.

As sound travels very quickly, the echo is not normally noticeable in small rooms because the time difference between the two waves arriving at Paul is so small. But in large rooms such as concert halls, the distances are much greater and the echo is much more pronounced.

The diagram opposite shows how to simulate an echo. Each byte of the sample is fed directly to the output. At the same time, each byte is also fed to a circular buffer. This is used to delay the byte for a certain length of time and when it eventually emerges from the delay buffer, it is mixed with whatever the output at that time happens to be. This output is then fed back into the delay buffer at a reduced level in order to simulate the echo being reflected back again from the walls.

To translate this into a program, each byte is taken from the original sample and mixed with a certain percentage of the byte emerging from the delay buffer. This value is stored in the output sample. The value from the buffer is then mixed with a different percentage of the output, and this value is stored back into the buffer. And that's all there is to it! This is exactly how the second listing *Echo* works and it is written in machine code for speed.

You may find that *Echo* does not have much effect on the samples produced using *Wave*. This is because the volume of these samples does not vary at all. Next month's programs will work better with *Echo*, as will the samples on the monthly subscribers' disc.

Another popular effect, although not often used on the Archimedes, is fuzz. This relies on distorting a sound by chopping off the tops and bottoms of waveforms. This is a very simple idea and quite easy to program, but we won't go into detail this month as it ties in better with volume in part two of this series. Meanwhile, we have provided the *Fuzz* program in yellow pages, so you can be playing around with it until next month.

That's enough for now. Next month we'll be taking a look at how volume and pitch envelopes can be used to alter the character of sounds. Plus, we will be examining a better synthesis routine, so make sure you don't miss the next instalment!

BAU PROGRAMS

Echo, *Wave* and *Fuzz* can be copied in from yellow pages. Instructions on how to type in a program can be found on page 76. They can also be loaded directly from the monthly subscribers' disc. In addition, two related programs available to *BAU* subscribers are *DSEdit*, a sound sample editing program, and *SampConv* used to convert samples from one format to another. The monthly disc also provides a collection of sounds that can be used with *Wave* and *Echo*.

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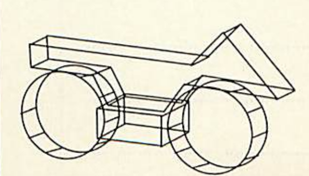
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● A310 Colour, Risc OS, software, good working condition – £400, Epson LX800 9 pin dot matrix printer – £100. Contact Stephen Perugi, 8 Bure Close, Brickhill, Bedford MK41 7TX

● Learning curve A3000, nearly new with monitor, stand, mouse, cover and £300 of games – £899. Contact M. Marks, Tel: (0532) 613145

● Master 128 – £199, Acorn JP150 Inkjet printer – £199, dual floppy – £75, 30Mb hard disc – £149, Turbo – £65, Bitstik – £45. Contact Paul, Tel : (0394) 380307 (work no.)

● A310 base unit, 2nd drive interface, Ext 2nd 3.5in + PSU – £600, Microvitec 1451 monitor – £150. Contact Dr P. Holder, Surrey. Tel: 081- 391 2582 (eves only)

● Archimedes 410, 20Mb hard disc, Taxan 770 + monitor, Beebug interface, Atomwide VIDC Inhancer, software – £975. Contact Tony, Essex. Tel: 081-517 2587

● Archimedes 310, 2 x 3.5in disc drives, Philips 8833 stereo colour monitor, software, all boxed, seldom used – £450. Contact Dr G. Olivier, Bath. Tel: (0225) 835910 after 6pm

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● A3000 1Mb – £430, CUB colour monitor – £120, 92Mb 16 bit SCSI – £330 very good condition, boxed. All – £850. Contact Daniel Lane, Bournemouth. Tel: (0202) 418875

● Archimedes 310, colour monitor, RISC OS, dual floppy, software, fully working – £400. Contact W. Stewart, Cardiff. Tel: (0222) 664639

● For Master 128: Quest mouse, Stop press, joystick, Ref Man, view printer drivers, games, BAU discs (5.25in), – £70 o.n.o. (will split). Contact P. Beckett, Cambs. Tel: (0945) 772085 (eves)0.0.

● Acorn Cambridge workstation. BBC B, 32016 coprocessor floppy and 20Mb drives colour monitor in one case – £400 o.v.n.o. Contact David Johnson, Huntingdon. Tel: (0480) 493073

● Z80 second processor for BBC B with manuals and discs – £50. Contact Mr Tillman, Surrey. Tel: 081-941 0931

● BBC B Amber screen monitor, three 40/80T drives, shadow Ram plus Modem, lots of software inc view – £100. Contact Sarah Ereiraz, London. Tel: 081- 444 9589

● Morley A3000 2Mb memory expandable to 4Mb – £45, Ballerna by Eterna – £10, View 3 Rom and manual – £20, all orignal software. Contact Mr M. Sutton, Suffolk. Tel: (0440) 706674

● A3000, colour monitor, disc interface, stand, 2Mb, all manuals, apps discs plus others – £675. Contact Paul Mason, Lincs. Tel: (0476) 75706

● BBC B, DFS, 40Tr disc drive, lightpen, joysticks, CC Speech, 104 programs in Rom, 32k SW Ram, 16 Soc Romboard, manuals. Will split, ask for list. Contact Inge Saunes, 6060 Hareid, Norway.

● BBC B with 40/80 drive, games etc. New parts excellent condition – £200 no offers. Contact Ian Wolstenholme, Oldham. Tel: (061) 633 4548

● Archimedes A3000 with Acorn colour monitor PC-Emulator, First-word games, 2 Meg, as new – £680. Contact David Woodward, Derbyshire. Tel: (0332) 673784

● Archimedes 440, 53Mb hard disc, Taxan 770+, Multsync monitor, 3.5in disk drive, loads of software – offers over £1000 sought. Contact Carol Carpenter, London. Tel: 081-445 7875

● Electron Plus1, Plus5, AMX mouse, DFS, Pixel, Perfect DTP package, inc fonts, clipart, wordpack etc – £195, Watford 256k printer buffer £85+p&p Contact Mr Graham, Middlesex. Tel: 081-847 0364.

● BBC B Taxan hi-res colour monitor, Juki 6100 printer, Watford 40/80T dual disk drives, Watford 32k Ram card, Modem, Tape recorder, some serious and game software. Mint condition – £795 o.n.o. Contact Tom Smitton, Kincardineshire. Tel: (03302) 3430

● BBC B, DFS 40/80 disc drive, cassette player, joystick, plinth, Roms include Pascal, View, Basic, 16k Sideways Ram, 32k Shadow Ram, printer generator – £340. Contact Mr D. Taylor, 202 Canon Street, Leicester LE4 6GH

● Electron 64k +1, +3, +2 Rom, View, Viewsheet, tape recorder, all leads and manuals, some games – £180, MX80 FT III printer and lead – £75. Contact Ralph Sillett, 22 Cherrybrook Drive, Penkridge, Staffs ST19 5EA

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● BBC Master 128k, colour monitor, 40/80 disk drive, 256k Challenger, 80186 co-processor, Viewstore and 3 other Roms, manuals – £500. Contact Phil, Harpenden. Tel: (0562) 767410

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● Rom/Ram podule with 6x32k battery backed Ram and Spellmaster Rom – £50. Contact M. Brooke, Lemgo Primary School, BFPO 41.

● Wanted to purchase Electron 32k cassette software suitable children 6-14 years. Contact D. Fogerty, Salisbury. Tel: (0722) 744162

● BBC Master 128, single disc drive, green monitor – £250 or nearest offer. Contact M. Collins, Worcs. Tel: (0684) 564972



Program	Page	BBC B B+	B+/ 128	Master 128	Master Compact	Electron	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Archimedes/ A3000/A5000	Monthly disc
✱INFO	**71**											
Info1								✱	✱		✱	✱
Info2		✱	✱	✱	✱	✱	✱	✱	✱	✱		✱
Info3 - 9												✱
Info10		✱	✱	✱	✱	✱	✱	✱	✱	✱	✱	✱
Arc Assembly	**54**							✱	✱		✱	✱
Wired for Sound	**70**							✱	✱		✱	✱
C For Yourself	**65**							✱	✱		✱	✱
!Graph Bonus Listing								✱	✱		✱	✱

Typing in listings from the yellow pages.

The yellow pages are subdivided into article headings. Each article heading corresponds with its article in the magazine.

So for instance to find listing one of ✱INFO in the yellow pages (Termite32) look for the ✱INFO heading, then follow the listings through until you get to listing five.

At the beginning of the program are a few lines that tell you what machines it works on. This information can also be derived from the table above.

For Archimedes owners it may not be immediately obvious how to actually type in the listings. By pressing Function key 12 you can access the command line. From here type BASIC and the Archimedes will enter the Basic language. You may like to type MODE 12, which will turn the screen to white on black.

Then simply copy each line of the program in turn after the '>' prompt, pressing RETURN when finished. Save the program onto disc by typing SAVE"<filename>". It can then be run by typing RUN. You will probably need to debug it as you may have made some typing errors.

When you have finished debugging save the program one last time. Then it can either be double-clicked upon from the desktop, or loaded using LOAD"<filename>".

A more detailed description of how to type in listings from the yellow pages appears in BBC Acorn User August 91.

✱INFO

Listing 1 – Termite32

```
   10 REM >Termite32 (Info1)
   20 REM Turing Termite
   30 REM by Michael Rozdoba
   40 REM for 32-bit machines
   50 REM (c) BAU June 1992
   60 :
   70 MODE 13
   80 PROCassemble
   90 PROCinitialise
  100 ON ERROR IF INKEY-1 OR ERR<>17 REP
ORT:PRINT" at line ";ERL:END
  110 PROCselect
  120 CALL termite
  130 END
  140 :
  150 DEF PROCinitialise
  160 l=ASC"L":r=ASC"R":b=ASC"B":f=ASC"F
"
  170 bla=0:red=20:gre=96:blu=134
  180 yel=red+gre:mag=blu+red:cya=blu+gr
e:whi=blu+gre+red
  190 tint=3
  200 red+=tint:gre+=tint:yel+=tint
  210 blu+=tint:mag+=tint:cya+=tint:whi+
=tint
  220 A=0:B=1:C=2:D=3
  230 E=4:F=5:G=6:H=7
  240 end%=-9999
  250 q%=2
  260 m%=0
  270 REPEAT
  280 READ d%
  290 IF d%<m% AND d%<>end% m%=d%
  300 q%+=1
  310 UNTIL d%=end%
  320 nsy%=-m%
  330 ENDPROC
  340 :
  350 DEF PROCselect
  360 ON
  370 REPEAT
  380 PRINTTAB(0,0);"System (1-"+STR$nsy
%+") ";
  390 INPUT sy%
  400 UNTIL sy%>=1 AND sy%<=nsy%
  410 RESTORE
  420 REPEAT
  430 READ d%
  440 UNTIL d%=-sy%
  450 READ q%
  460 WHILE q%>=0
  470 READ w%,c%,d%,s%
  480 ar!(32*q%+4*w%)=c%+256*s%+65536*d%
  490 READ q%
  500 ENDWHILE
  510 OFF
  520 CLS
  530 ENDPROC
  540 :
  550 DEF PROCassemble
  560 DIM code% &400
  570 !code%=149:code%!4=-1
  580 SYS "OS_ReadVduVariables",code%,co
de%
  590 screen=!code%
  600 count=0:temp=1:temp2=2
  610 table=3:x=4:y=5:xi=6:yi=7
  620 scrst=8:state=9:data=10
  630 const=11:col=12
  640 link=14:pc=15
  650 FOR pass%=0 TO 2 STEP 2
  660 P%=code%
  670 [OPT pass%
  680 .termite
  690 ADR     table,ar
  700 LDR     scrst,ascrst
  710 MOV     const,#255
  720 MOV     x,#160
  730 MOV     y,#128
  740 MOV     xi,#1
  750 MOV     yi,#0
  760 MOV     state,#0
  770 .loop   MOV     count,#1024
  780 .innerloop
  790 ADD     temp,scrst,y,LSL #8
  800 ADD     temp,temp,y,LSL #6
  810 LDRB    col,[temp,x]!
  820 ADD     temp2,table,state,LSL #5
  830 LDR     data,[temp2,col,LSL #2]
  840 STRB    data,[temp]
  850 MOV     temp,data,LSR #16
  860 MOV     temp2,yi
  870 CMP     temp,#ASC"L"
  880 RSBEQ   temp2,xi,#0
  890 MOVEQ   xi,yi
  900 CMP     temp,#ASC"R"
  910 MOVEQ   temp2,xi
  920 RSBEQ   xi,yi,#0
  930 CMP     temp,#ASC"B"
  940 RSBEQ   temp2,yi,#0
  950 RSBEQ   xi,xi,#0
  960 MOV     yi,temp2
  970 ADDS    x,x,xi
  980 ADDMI   x,x,#320
  990 CMP     x,#320
 1000 MOVEQ   x,#0
 1010 ADDS    y,y,yi
 1020 MOVMI   y,#255
 1030 CMP     y,#256
 1040 MOVEQ   y,#0
 1050 AND     state,const,data,LSR #8
 1060 SUBS    count,count,#1
 1070 BNE     innerloop
 1080 SWI     "OS_ReadEscapeState"
 1090 BCC     loop
 1100 MOV     pc,link
 1110 .ascrst EQUD    screen
 1120 .ar
 1130 ]
 1140 NEXT
 1150 ENDPROC
 1160 :
 1170 DATA -1,  A,bla,red,l,A, A,red,bla
,r,A
 1180 DATA -2,  A,bla,gre,l,A, A,gre,bla
,f,B
 1190 DATA      B,bla,gre,r,A, B,gre,gre
,r,A
 1200 DATA -3,  A,bla,mag,r,A, A,mag,blu
,r,A, A,blu,gre,l,A, A,gre,bla,l,A
 1210 DATA -4,  A,bla,red,b,A, A,red,yel
,r,A, A,yel,gre,f,A, A,gre,bla,l,B
 1220 DATA      B,bla,gre,b,B, B,gre,yel
,r,B, B,yel,red,f,B, B,red,bla,l,A
 1230 DATA -5,  A,bla,red,b,A, A,red,yel
,r,A, A,yel,gre,l,A, A,gre,bla,l,B
 1240 DATA      B,bla,gre,b,B, B,gre,yel
,r,B, B,yel,red,l,B, B,red,bla,l,A
 1250 DATA -6,  A,bla,mag,r,A, A,mag,blu
,l,A, A,blu,gre,l,A, A,gre,bla,r,A
 1260 DATA end%
```

Listing 2 – Termite8

```
   10 REM >Termite8 (Info2)
   20 REM Turing Termite
   30 REM Original by Michael Rozdoba
   40 REM 8-bit version by Dave Acton
   50 REM for eight-bit machines
   60 REM (c) BAU June 1992
   70 :
   80 MODE 2
   90 VDU 23;8202;0;0;0;
  100 PROCassemble
  110 PROCinitialise
  120 ON ERROR IF INKEY-1 OR ERR<>17 REP
ORT:PRINT" at line ";ERL:END
  130 PROCselect
  140 CALL termite
  150 END
  160 :
  170 DEF PROCinitialise
  180 f=0:l=1:r=-1:b=2
  190 bla=0:red=1:gre=2:yel=3
  200 blu=4:mag=5:cya=6:whi=7
  210 A=0:B=1:C=2:D=3
  220 E=4:F=5:G=6:H=7
  230 end%=-9999
  240 q%=2
  250 m%=0
  260 REPEAT
  270 READ d%
  280 IF d%<m% AND d%<>end% m%=d%
  290 q%=q%+1
  300 UNTIL d%=end%
  310 nsy%=-m%
  320 ENDPROC
  330 :
  340 DEF PROCselect
  350 REPEAT
  360 PRINTTAB(0,0);"System (1-"+STR$nsy
%+") ";
  370 INPUT sy%
  380 UNTIL sy%>=1 AND sy%<=nsy%
  390 RESTORE
  400 REPEAT
  410 READ d%
  420 UNTIL d%=-sy%
  430 READ q%
  440 REPEAT
  450 IF q%>=0 READ w%,c%,d%,s%:table!(3
2*q%+4*w%)=c%+&2000*s%+&10000*d%:READ q%
  460 UNTIL q%<0
  470 CLS
  480 ENDPROC
  490 :
  500 DEF PROCassemble
  510 DIM code% &400
  520 x=&70
  530 y=&71
  540 dir=&72
  550 state=&73
  560 temp=&74
  570 xbit=&75
  580 addr=&76
  590 poketab%=&80
  600 xo=&88
  610 yo=&8C
  620 FOR pass%=0 TO 2 STEP 2
  630 P%=code%
  640 [OPT pass%
  650 .termite
  660 LDA #80
  670 STA x
  680 LDA #128
  690 STA y
  700 LDA #0
  710 STA dir
  720 STA state
  730 .loop
  740 LDY #0
  750 STY addr+1
  760 LDA x
  770 LSR A
  780 ROR xbit
  790 ASL A
  800 ASL A
  810 ROL addr+1
  820 ASL A
  830 ROL addr+1
  840 STA addr
  850 LDA y
  860 LSR A
  870 LSR A
  880 LSR A
  890 TAX
  900 LDA y
  910 AND #7
  920 ORA lo%,X
  930 CLC
  940 ADC addr
  950 STA addr
  960 LDA hi%,X
  970 ADC addr+1
  980 STA addr+1
  990 LDA (addr),Y
 1000 BIT xbit
 1010 BMI peek2
 1020 LSR A
 1030 .peek2
 1040 TAX
 1050 LDA state
 1060 ORA peektab%,X
 1070 TAX
 1080 LDY table,X
 1090 LDA poketab%,Y
 1100 STA temp
 1110 LDA #&AA
 1120 BIT xbit
 1130 BMI poke2
 1140 LSR A
 1150 ASL temp
 1160 .poke2
 1170 LDY #0
 1180 AND (addr),Y
 1190 ORA temp
 1200 STA (addr),Y
 1210 LDA table+1,X
 1220 STA state
 1230 LDA dir
 1240 CLC
 1250 ADC table+2,X
 1260 STA dir
 1270 AND #3
 1280 TAX
 1290 LDA x
```




```
1300 CLC
1310 ADC xo,X
1320 CMP #160
1330 BCC xnotoff
1340 BNE xisneg
1350 LDA #0
1360 BEQ xnotoff \ =JMP
1370 .xisneg
1380 LDA #159
1390 .xnotoff
1400 STA x
1410 LDA y
1420 CLC
1430 ADC yo,X
1440 STA y
1450 BIT &FF
1460 BPL loop
1470 RTS
1480 ]
1490 lo%=P%:P%=P%+32
1500 hi%=P%:P%=P%+32
1510 peektab%=P%:P%=P%+128
1520 table=P%
1530 NEXT
1540 FOR i%=0 TO 31
1550 a%=&3000+640*i%
1560 lo%?i%=a% MOD 256
1570 hi%?i%=a% DIV 256
1580 NEXT
1590 FOR i%=0 TO 127
1600 i%?peektab%=(i% AND 1)*4+(i% AND 4
)*2+(i% AND 16)
1610 NEXT
1620 FOR i%=0 TO 7
1630 i%?poketab%=(i% AND 1)+2*(i% AND 2
)+4*(i% AND 4)
1640 NEXT
1650 !xo=&00FF0001
1660 !yo=&0100FF00
1670 ENDPROC
1680 :
1690 DATA -1
1700 DATA A,bla,red,l,A, A,red,bla,r,A
1710 DATA -2
1720 DATA A,bla,gre,l,A, A,gre,bla,f,B
1730 DATA B,bla,gre,r,A, B,gre,gre,r,A
1740 DATA -3
1750 DATA A,bla,mag,r,A, A,mag,blu,r,A
1760 DATA A,blu,gre,l,A, A,gre,bla,l,A
1770 DATA -4
1780 DATA A,bla,red,b,A, A,red,yel,r,A
1790 DATA A,yel,gre,f,A, A,gre,bla,l,B
1800 DATA B,bla,gre,b,B, B,gre,yel,r,B
1810 DATA B,yel,red,f,B, B,red,bla,l,A
1820 DATA -5
1830 DATA A,bla,red,b,A, A,red,yel,r,A
1840 DATA A,yel,gre,l,A, A,gre,bla,l,B
1850 DATA B,bla,gre,b,B, B,gre,yel,r,B
1860 DATA B,yel,red,l,B, B,red,bla,l,A
1870 DATA -6
1880 DATA A,bla,mag,r,A, A,mag,blu,l,A
1890 DATA A,blu,gre,l,A, A,gre,bla,r,A
1900 DATA end%
```

Listing 3 – Lines

```
10 REM >Lines (Info3)
20 REM Dithered lines
30 REM by Jan Vibe
40 REM for 32-bit machines
50 REM (c) BAU June 1992
60 :
70 MODE 15
80 OFF
90 DIM ct%(255),pt%(8,4,32)
100 FOR i%=1 TO 32
110 FOR n%=1 TO i%
120 REPEAT
130 x%=RND(8)
140 y%=RND(4)
150 UNTIL pt%(x%,y%,i%)=0
160 pt%(x%,y%,i%)=1
170 NEXT
180 NEXT
190 RESTORE 910
200 FOR n%=0 TO 255
210 READ ct%(n%)
220 NEXT
230 :
240 REPEAT
250 x1%=RND(1180)+50
260 y1%=RND(924)+50
270 x2%=RND(1180)+50
280 y2%=RND(924)+50
290 b%=RND(73)+7
300 c1%=RND(27)-1
310 c2%=RND(27)-1
320 PROCl(x1%,y1%,x2%,y2%,b%,c1%,c2%)
330 UNTIL FALSE
340 :
350 DEF PROCl(x1%,y1%,x2%,y2%,b%,c1%,c
2%)
360 LOCAL d%,n%,m%,f%,x,y,z,s%,p%,f1%,
f2%,gp%
370 d%=SQR((x2%-x1%)^2+(y2%-y1%)^2)
380 dx=(x2%-x1%)/d%
390 dy=(y2%-y1%)/d%
400 f%=RND(27)-1
410 FOR m%=0 TO 7
420 z=b%-m%*b%/7.5
430 s%=z/4
440 IF s%<2 s%=2
450 PROCf(c1%,m%)
460 f1%=c%
470 PROCf(c2%,m%)
480 f2%=c%
490 FOR n%=0 TO d% STEP s%
500 x=(n%*x2%+(d%-n%)*x1%)/d%
510 y=(n%*y2%+(d%-n%)*y1%)/d%
520 gp%=p%
530 p%=32*n%/d%
540 IF p%<>gp% PROCp(f1%,f2%,p%)
550 CIRCLE FILL x,y,z
560 NEXT
570 PROCf(c1%,m%)
580 CIRCLE FILL x2%,y2%,z
590 NEXT
600 ENDPROC
610 :
620 DEF PROCp(c1%,c2%,p%)
630 LOCAL n%,m%,k%
640 FOR m%=1 TO 4
650 VDU 23,m%+1
660 FOR n%=1 TO 8
670 k%=pt%(n%,m%,p%)
680 VDU k%*c1%+(1-k%)*c2%
690 NEXT
700 NEXT
710 GCOL 80,0 TINT c%
720 FOR n%=1 TO 8
730 SWAP pt%(RND(8),RND(4),p%),pt%(RND
(8),RND(4),p%)
740 NEXT
750 ENDPROC
760 :
770 DEF PROCf(f%,i%)
780 LOCAL r%,g%,b%
790 b%=f% DIV 9
800 f%-=9*b%
810 g%=f% DIV 3
820 f%-=3*g%
830 r%=f%
840 f%=r%+4*g%+16*b%
850 IF i%>=4 f%=f%+&15:i%=i% MOD 4
860 i%=64*i%
870 GCOL f% TINT i%
880 c%=ct%(f%+i%)
890 ENDPROC
900 :
910 DATA 0,4,16,20,32,36,48,52,64,68,8
0,84,96,100,112,116
920 DATA 8,12,24,28,40,44,56,60,72,76,
88,92,104,108,120,124
930 DATA 128,132,144,148,160,164,176,1
80,192,196,208,212,224,228,240,244
940 DATA 136,140,152,156,168,172,184,1
88,200,204,216,220,232,236,248,252
950 DATA 1,5,17,21,33,37,49,53,65,69,8
1,85,97,101,113,117
960 DATA 9,13,25,29,41,45,57,61,73,77,
89,93,105,109,121,125
970 DATA 129,133,145,149,161,165,177,1
81,193,197,209,213,225,229,241,245
980 DATA 137,141,153,157,169,173,185,1
89,201,205,217,221,233,237,249,253
990 DATA 2,6,18,22,34,38,50,54,66,70,8
2,86,98,102,114,118
1000 DATA 10,14,26,30,42,46,58,62,74,78
,90,94,106,110,122,126
1010 DATA 130,134,146,150,162,166,178,1
82,194,198,210,214,226,230,242,246
1020 DATA 138,142,154,158,170,174,186,1
90,202,206,218,222,234,238,250,254
1030 DATA 3,7,19,23,35,39,51,55,67,71,8
3,87,99,103,115,119
1040 DATA 11,15,27,31,43,47,59,63,75,79
,91,95,107,111,123,127
1050 DATA 131,135,147,151,163,167,179,1
83,195,199,211,215,227,231,243,247
1060 DATA 139,143,155,159,171,175,187,1
91,203,207,219,223,235,239,251,255
```

Listing 4 – GiantECF

```
10 REM >GiantECF (Info4)
20 REM by Dave Acton
30 REM for 32-bit machines only
40 REM (c) BAU June 1992
50 :
60 MODE 4
70 PRINT"BAU"
80 FOR ecf%=0 TO 3
90 VDU 23,2+ecf%
100 FOR y%=0 TO 7
110 a%=0
120 FOR x%=0 TO 7
130 a%+=POINT(ecf%*32+x%*4,1023-4*y%)<
<(7-x%)
140 NEXT
150 VDU a%
160 NEXT
170 NEXT
180 FOR test%=1 TO 500
190 x%=RND(1000)+140
200 y%=RND(600)+140
210 r%=RND(120)+20
220 GCOL 0,0
230 CIRCLE FILL x%,y%,r%+8
240 GCOL 80,0
250 CIRCLE FILL x%,y%,r%
260 GCOL 0,1
270 CIRCLE x%,y%,r%
280 NEXT
290 END
```

Listing 5 – AlienTree

```
10 REM >AlienTree (Info5)
20 REM by Jan Vibe
30 REM for 32-bit machines
40 REM (c) BAU June 1992
50 :
60 MODE 15
70 OFF
80 DIM ct%(255),pt%(8,4,32)
90 FOR i%=1 TO 32
100 FOR n%=1 TO i%
110 REPEAT
120 x%=RND(8)
130 y%=RND(4)
140 UNTIL pt%(x%,y%,i%)=0
150 pt%(x%,y%,i%)=1
160 NEXT
170 NEXT
180 RESTORE 1380
190 FOR n%=0 TO 255
200  READ ct%(n%)
210 NEXT
220 k%=1000
230 DIM xa%(k%),ya%(k%),xb%(k%),yb%(k%
),b%(k%),ca%(k%),cb%(k%)
240 DIM fx%(k%),fy%(k%),fl%(k%)
250 PROCf(16,0)
260 RECTANGLE FILL 0,0,1280,300
270 PROCf(21,7)
280 RECTANGLE FILL 0,300,1280,724
290 FOR n%=500 TO 200 STEP -1
300 ma%=RND(n%/4)+8
310 mi%=RND(ma%/2)+4
320 PROCf(26,RND(4)+3)
330 ELLIPSE FILL RND(1280),RND(400)+50
0,ma%,mi%
340 NEXT
350 GCOL 0 TINT 0
360 ct%=0
370 ft%=0
380 PROCa(640,0,260,RND(27)-1,0,64,1)
390 FOR m%=0 TO 7
400 FOR n%=1 TO ct%
410 PROCl(xa%(n%),ya%(n%),xb%(n%),yb%(
n%),b%(n%),m%,ca%(n%),cb%(n%))
420 NEXT
430 NEXT
440 FOR n%=1 TO ft%
450 fc%=RND(27)-1
460 r%=RND(fl%(n%))+fl%(n%)
470 FOR m%=0 TO 7
480 d%=r%-r%*m%/7
490 PROCf(fc%,m%)
500 CIRCLE FILL fx%(n%),fy%(n%),d%
510 NEXT
520 NEXT
530 END
540 :
550 DEF PROCa(x1%,y1%,z%,c1%,v%,b%,d%)
560 LOCAL x2%,y2%,c2%,zm%,t
570 zm%=z%
580 IF z%<32 zm%=1.5*z%
590 t=RAD(v%)
600 x2%=x1%+zm%*SIN(t)
610 y2%=y1%+zm%*COS(t)
620 c2%=RND(27)-1
630 ct%+=1
640 xa%(ct%)=x1%
650 ya%(ct%)=y1%
660 xb%(ct%)=x2%
670 yb%(ct%)=y2%
680 b%(ct%)=b%
690 ca%(ct%)=c1%
700 cb%(ct%)=c2%
710 LINE x1%,y1%,x2%,y2%
720 IF z%>=32 THEN
730 PROCa(x2%,y2%,z%/(1.2+RND(1)*.3),c
2%,v%-30-RND(20),b%/1.5,d%+1)
740 PROCa(x2%,y2%,z%/(1.2+RND(1)*.3),c
2%,v%+30+RND(20),b%/1.5,d%+1)
750 ELSE
760 ft%+=1
770 fx%(ft%)=x2%
780 fy%(ft%)=y2%
790 fl%(ft%)=z%/3
800 ENDIF
810 ENDPROC
820 :
830 DEF PROCl(x1%,y1%,x2%,y2%,b%,m%,c2
%,c1%)
840 LOCAL d%,n%,f%,x,y,z,s%,p%,f1%,f2%
,gp%
850 d%=SQR((x2%-x1%)^2+(y2%-y1%)^2)
860 dx=(x2%-x1%)/d%
870 dy=(y2%-y1%)/d%
880 z=b%-m%*b%/7.5
890 s%=z/2
900 IF s%<2 s%=2
910 PROCf(c1%,m%)
920 f1%=c%
930 PROCf(c2%,m%)
940 f2%=c%
950 IF z>=2 OR m%=0 THEN
960 FOR n%=0 TO d% STEP s%
970 x=(n%*x2%+(d%-n%)*x1%)/d%
980 y=(n%*y2%+(d%-n%)*y1%)/d%
990 gp%=p%
1000 p%=32*n%/d%
1010 IF p%<>gp% PROCp(f1%,f2%,p%)
1020 CIRCLE FILL x,y,z
1030 NEXT
1040 PROCf(c1%,m%)
1050 CIRCLE FILL x2%,y2%,z
1060 ENDIF
1070 ENDPROC
1080 :
1090 DEF PROCp(c1%,c2%,p%)
1100 LOCAL n%,m%,k%
1110 FOR m%=1 TO 4
1120 VDU 23,m%+1
1130 FOR n%=1 TO 8
1140 k%=pt%(n%,m%,p%)
1150 VDU k%*c1%+(1-k%)*c2%
1160 NEXT
1170 NEXT
1180 GCOL 80,0 TINT c%
1190 FOR n%=1 TO 4
1200  SWAP pt%(RND(8),RND(4),p%),pt%(RN
D(8),RND(4),p%)
1210 NEXT
1220 ENDPROC
1230 :
1240 DEF PROCf(f%,i%)
1250 LOCAL r%,g%,b%
1260 b%=f% DIV 9
1270 f%-=9*b%
1280 g%=f% DIV 3
1290 f%-=3*g%
1300 r%=f%
1310 f%=r%+4*g%+16*b%
1320 IF i%>=4 f%+=&15:i%=i% MOD 4
1330 i%=64*i%
1340 GCOL f% TINT i%
1350 c%=ct%(f%+i%)
1360 ENDPROC
1370 :
1380 DATA 0,4,16,20,32,36,48,52,64,68,8
0,84,96,100,112,116
1390 DATA 8,12,24,28,40,44,56,60,72,76,
88,92,104,108,120,124
1400 DATA 128,132,144,148,160,164,176,1
80,192,196,208,212,224,228,240,244
1410 DATA 136,140,152,156,168,172,184,1
88,200,204,216,220,232,236,248,252
1420 DATA 1,5,17,21,33,37,49,53,65,69,8
1,85,97,101,113,117
1430 DATA 9,13,25,29,41,45,57,61,73,77,
89,93,105,109,121,125
1440 DATA 129,133,145,149,161,165,177,1
81,193,197,209,213,225,229,241,245
1450 DATA 137,141,153,157,169,173,185,1
89,201,205,217,221,233,237,249,253
1460 DATA 2,6,18,22,34,38,50,54,66,70,8
2,86,98,102,114,118
1470 DATA 10,14,26,30,42,46,58,62,74,78
,90,94,106,110,122,126
1480 DATA 130,134,146,150,162,166,178,1
82,194,198,210,214,226,230,242,246
1490 DATA 138,142,154,158,170,174,186,1
90,202,206,218,222,234,238,250,254
1500 DATA 3,7,19,23,35,39,51,55,67,71,8
3,87,99,103,115,119
1510 DATA 11,15,27,31,43,47,59,63,75,79
,91,95,107,111,123,127
1520 DATA 131,135,147,151,163,167,179,1
83,195,199,211,215,227,231,243,247
1530 DATA 139,143,155,159,171,175,187,1
91,203,207,219,223,235,239,251,255
```

Listing 6 – Wierdo

```
10 REM >Weirdo (Info6)
20 REM by Jan Vibe
30 REM for 32-bit machines only
40 REM (c) BAU June 1992
50 :
60 MODE 137
70 MODE 9
80 OFF
90 ORIGIN 640,512
100 s1%=1
110 s2%=2
120 p%=0
130 k%=2
140 DIM a%(k%,4),x%(k%),y%(k%),px%(k%,
15),py%(k%,15),z%(15),f(15)
150 FOR n%=1 TO 15
160  COLOUR n%,16*n%,0,2*n%+78
170  f(n%)=1+(15-n%)/20
180 NEXT
190 FOR n%=0 TO 2
200 FOR m%=1 TO 5
210 z%(m%+5*n%)=4*n%+4
220 NEXT
230 NEXT
240 ON ERROR GOTO 600
250 REPEAT
260 FOR n%=1 TO k%
270 FOR m%=1 TO 4
280 a%(n%,m%)=RND(5)+3
290 NEXT
300 NEXT
310 FOR n%=1 TO 360
320 WAIT
330 SYS "OS_Byte",112,s1%
340 SYS "OS_Byte",113,s2%
350 CLS
360 SWAP s1%,s2%
370 p%=p% MOD 15+1
380 FOR m%=1 TO k%
390 x%(m%)=500*SINRAD(a%(m%,1)*n%)*COS
RAD(a%(m%,2)*n%)
400 px%(m%,p%)=x%(m%)
410 y%(m%)=400*SINRAD(a%(m%,3)*n%)*COS
RAD(a%(m%,4)*n%)
420 py%(m%,p%)=y%(m%)
430 NEXT
440 FOR i%=1 TO 15
450 GCOL i%
460 FOR m%=1 TO k%
470 CIRCLE FILL x%(m%)*i%/15,y%(m%)*i%
/15,12*(16-i%)
480 NEXT
490 NEXT
500 FOR m%=1 TO k%
510 FOR i%=1 TO 15
520 GCOL i%
530 p1%=(p%+i%-1) MOD 15+1
540 CIRCLE FILL px%(m%,p1%)*f(i%),py%(
m%,p1%)*f(i%),z%(i%)
550 NEXT
560 NEXT
570 NEXT
580 UNTIL FALSE
590 :
600 SYS "OS_Byte",112,s1%
610 REPORT
620 PRINT" at line "STR$ERL
630 ON
640 END
```

Listing 7 – Graph+

```
   10 REM > !RunImage (Graph2)
   20 REM by Mike Curnow
   41 REM Line and Symbol extensions by
David Waters
 1650 IF bar% THEN PROCsbar2 ELSE IF ln%
(gr%)>Ø PROCWout(Ø)
 1671 IF NOT bar% PROCdsymbol
 2110 DEFPROCsgraph:LOCAL x,y
 2120 x=adx%+xd*xsd:y=ady%+yd*ysd
 2130 CASE ln%(gr%) OF
 2140 WHEN Ø:REM no line
 2150 WHEN 1:IF first% THEN PROCphdr(nxy
%(gr%),adx%,ady%,axm%,aym%,-1,Ø,64,Ø):PR
OCpthm(x,y):ELSE PROCpthd(x,y):REM segme
nted line
 2160 WHEN 2:XL(P%)=x:YL(P%)=y:IF P%=nxy
%(gr%):PROCfit(adx%,ady%,axm%,aym%):PROC
phdr(2,adx%,ady%,axm%,aym%,-1,Ø,64,Ø):PR
OCpthm(xstart,ystart):PROCpthd(xend,yend
):REM least-squares fit
 2161 ENDCASE
 2950 x$()="":sym%()=Ø:ln%()=1
 3721 WHEN "LINE":ln%(gr%)=yd
 3722 WHEN "SYMBOL":sym%(gr%)=yd
 3750 OTHERWISE:Z%=FALSE:n%+=1:IF gr%=Ø
gr%=1:sym%(1)=sym%(Ø):ln%(1)=ln%(Ø)
 4720 DEFPROCpgraph:LOCAL x,y
 4721 x=axo%+(xd-xlo)*xs:y=ayo%+(yd-ylo)
*ys
 4730 CASE ln%(gr%) OF
 4731 WHEN Ø:MOVE x,y:PROCsymbol(sym%(gr
%),x,y)
 4732 WHEN 1:IF first% THEN MOVE x,y:PRO
Csymbol(sym%(gr%),x,y) ELSE DRAW x,y:PRO
Csymbol(sym%(gr%),x,y)
 4733 WHEN 2:MOVE x,y:PROCsymbol(sym%(gr
%),x,y):XL(P%)=x:YL(P%)=y:IF P%=nxy%(gr%
) PROCfit(axo%,ayo%,axo%+gx%,ayo%+gy%):L
INE xstart,ystart,xend,yend
 4734 ENDCASE
 6211 DIM sym%(10),ln%(10),XL(Maxdata),Y
L(Maxdata),cf(30),sf(30)
 6212 FOR I%=1 TO 16:cf(I%)=COS(I%*PI/8)
:sf(I%)=SIN(I%*PI/8):NEXT
 7390 :
 7400 DEFPROCsymbol(n%,x,y):LOCAL s():DI
M s(3)
 7410 s(1)=(gx%+gy%)/200:s(2)=s(1)/1.4:s
(3)=s(1)/1.2
 7420 CASE n% OF
 7430 WHEN 1:MOVE x-s(1),y-s(1)/SQR(3):D
RAWBY s(1),s(1)*SQR(3):DRAWBY s(1),-s(1)
*SQR(3):DRAWBY -2*s(1),Ø:MOVEBY s(1),s(1
)/SQR(3)
 7440 WHEN 2:RECTANGLE x-s(2),y-s(2),2*s
(2),2*s(2):MOVEBY s(2),s(2)
 7450 WHEN 3:CIRCLE x,y,s(3):MOVEBY -s(3
),Ø
 7460 WHEN 4:MOVE x-s(1),y-s(1)/SQR(3):D
RAWBY s(1),s(1)*SQR(3):PLOT81,s(1),-s(1)
*SQR(3):MOVE x,y
 7470 WHEN 5:RECTANGLE FILL x-s(2),y-s(2
),2*s(2),2*s(2):MOVE x,y
 7480 WHEN 6:CIRCLE FILL x,y,s(3):MOVE x
,y
 7490 ENDCASE
 7500 ENDPROC
 7510 :
 7520 DEFPROCdsymbol:LOCAL x,y,I%,s():DI
M s(3)
 7530 d%=Ø:s(1)=(vx+vy)*180*256/200:s(2)
=s(1)/1.4:s(3)=s(1)/1.2
 7540 FOR gr%=1 TO ng%
 7550 FOR P%=1 TO nxy%(gr%)
 7560 xd=X(d%)-xlo:yd=Y(d%)-ylo:d%+=1
 7570 x=adx%+xd*xsd:y=ady%+yd*ysd
 7580 CASE sym%(gr%) OF
 7590 WHEN Ø:REM no symbols
 7600 WHEN 1:PROCphdr(4,adx%,ady%,axm%,a
ym%,-1,Ø,64,Ø):PROCpthm(x-s(1),y-s(1)/SQ
R(3)):PROCpthd(x,y+2*s(1)/SQR(3)):PROCpt
hd(x+s(1),y-s(1)/SQR(3)):PROCpthd(x-s(1)
,y-s(1)/SQR(3)):PROCWout(Ø):REM open tri
angles
 7610 WHEN 2:PROCphdr(5,adx%,ady%,axm%,a
ym%,-1,Ø,64,Ø):PROCpthm(x-s(2),y-s(2)):P
ROCpthd(x-s(2),y+s(2)):PROCpthd(x+s(2),y
+s(2)):PROCpthd(x+s(2),y-s(2)):PROCpthd(
x-s(2),y-s(2)):PROCWout(Ø):REM open squa
res
 7620 WHEN 3:PROCphdr(17,adx%,ady%,axm%,
aym%,-1,Ø,64,Ø):PROCpthm(x+s(3),y):FOR I
%=1 TO 16:PROCpthd(x+s(3)*cf(I%),y+s(3)*
sf(I%)):NEXT:PROCWout(Ø):REM open "circl
es"
 7630 WHEN 4:PROCphdr(4,adx%,ady%,axm%,a
ym%,Ø,Ø,64,Ø):PROCpthm(x-s(1),y-s(1)/SQR
(3)):PROCpthd(x,y+2*s(1)/SQR(3)):PROCpth
d(x+s(1),y-s(1)/SQR(3)):PROCpthd(x-s(1),
y-s(1)/SQR(3)):PROCWout(Ø):REM filled tr
iangles
 7640 WHEN 5:PROCphdr(5,adx%,ady%,axm%,a
ym%,Ø,Ø,64,Ø):PROCpthm(x-s(2),y-s(2)):PR
OCpthd(x-s(2),y+s(2)):PROCpthd(x+s(2),y+
s(2)):PROCpthd(x+s(2),y-s(2)):PROCpthd(x
-s(2),y-s(2)):PROCWout(Ø):REM filled squ
ares
 7650      WHEN 6:PROCphdr(17,adx%,ady%,a
xm%,aym%,Ø,Ø,64,Ø):PROCpthm(x+s(3),y):FO
R I%=1 TO 16:PROCpthd(x+s(3)*cf(I%),y+s(
3)*sf(I%)):NEXT:PROCWout(Ø):REM filled "
circles"
 7660 ENDCASE
 7670 NEXT
 7680 NEXT
 7690 ENDPROC
 7700 :
 7710 DEFPROCfit(xØ,yØ,x1,y1):LOCAL I%,x
m,ym,num,denom,xi,yi,m:xm=Ø:ym=Ø
 7720 FOR I%=1 TO nxy%(gr%):xm=xm+XL(I%)
:ym=ym+YL(I%):NEXT
 7730 xm=xm/nxy%(gr%):ym=ym/nxy%(gr%)
 7740 num=Ø:denom=Ø:FOR I%=1 TO nxy%(gr%
):num=num+(XL(I%)-xm)*(YL(I%)-ym):denom=
denom+(XL(I%)-xm)*(XL(I%)-xm):NEXT
 7750 m=num/denom
 7760 REM Find intersections with bounda
ries (left, right, bottom, top)
 7770 xstart=Ø:ystart=Ø:xend=Ø:yend=Ø
 7780 yi=ym+m*(xØ-xm):IF yi>=yØ AND yi<=
y1 THEN xstart=xØ:ystart=yi
 7790 yi=ym+m*(x1-xm)
 7800 IF yi>=yØ AND yi<=y1 THEN
 7810 IF xstart=Ø AND ystart=Ø THEN xsta
rt=x1:ystart=yi ELSE xend=x1:yend=yi
 7820 ENDIF
 7830 xi=(yØ-ym)/m+xm
 7840 IF xi>xØ AND xi<x1 THEN
 7850 IF xstart=Ø AND ystart=Ø THEN xsta
rt=xi:ystart=yØ ELSE xend=xi:yend=yØ
 7860 ENDIF
 7870 xi=(y1-ym)/m+xm
 7880 IF xi>xØ AND xi<x1 THEN xend=xi:ye
nd=y1
 7890 ENDPROC
```

Listing 8 – SquashS

```
   10 REM >SquashS (Info8)
   20 REM By Brian Cooke
   30 REM For RiscOS 3 only
   40 REM (C) BAU June 1992
   50 :
   60 ON ERROR CLOSE #Ø:PRINTREPORT$;" a
t line ";ERL:END
   70 InSize=1024
   80 OutSize=1024
   90 PROCcode
  100 SYS "OS_File",10,"%.SquashUtil",&F
FA,,code,O%
  110 SYS "OS_Module",11,code,O%-code
  120 END
  130 :
  140 DEF PROCcode
  150 wp_next=Ø
  160 Input=FNwp(4)
  170 Work=FNwp(4)
  180 InputSize=FNwp(4)
  190 Handle=FNwp(4)
  200 attr=FNwp(4)
  210 FileName=FNwp(4)
  220 Output=FNwp(4)
  230 time=FNwp(8)
  240 RMA_SIZE=wp_next
  250 :
  260 DIM code &8000
  270 wp=12
  280 sp=13
  290 link=14
  300 pc=15
  310 FOR pass=4 TO 6 STEP 2:P%=Ø:O%=cod
e
  320 [OPT pass
  330 EQUD    Ø
  340 EQUD    Init_Code
  350 EQUD    Final_Code
  360 EQUD    Ø
  370 EQUD    Title_String
  380 EQUD    Help_String
  390 EQUD    Ø
  400 EQUD    %1101111111111000000
  410 EQUD    SWI_Handler
  420 EQUD    SWI_Names
  430 EQUD    Ø
  440 :
  450 .Title_String
  460 EQUS ·  "SquashUtils"
  470 EQUB    Ø
  480 :
  490 .Help_String
  500 EQUS    "Squash Utils"
  510 EQUB    9
  520 EQUS    "Ø.02 (27 Mar 1992) Brian
Cooke"
  530 EQUB    Ø
  540 ALIGN
  550 .SWI_Names
  560 EQUS    "Squashed"
  570 EQUB    Ø
  580 EQUS    "Load"
  590 EQUB    Ø
  600 EQUS    "Info"
  610 EQUB    Ø
  620 EQUS    "Save"
  630 EQUB    Ø
  640 EQUB    Ø
  650 :
  660 ALIGN
  670 :
  680 .Init_Code
  690 STMFD   (sp)!,{R1-R4,link}
  700 MOV     RØ,#6
  710 MOV     R3,#RMA_SIZE
  720 SWI     "XOS_Module"
  730 BVS     no_init
  740 STR     R2,[R12]
  750 .no_init
  760 LDMFD   (sp)!,{R1-R4,pc}
  770 :
  780 .Final_Code
  790 STMFD   (sp)!,{R1-R4,link}
  800 LDR     wp,[R12]
  810 MOV     RØ,#7
  820 MOV     R2,wp
  830 SWI     "XOS_Module"
  840 LDMFD   (sp)!,{R1-R4,pc}
  850 :
  860 .SWI_Handler
  870 LDR     wp,[R12]
  880 CMP     R11,#(eojt-jt)/4
  890 ADDCC   pc,pc,R11,LSL #2
  900 B       Unknown_SWI
  910 .jt
  920 B       SWI_Load
  930 B       SWI_Info
  940 B       SWI_Save
  950 .eojt
  960 .Unknown_SWI
  970 ADR     RØ,unknown_error
  980 ORRS    pc,link,#1<<28
  990 .unknown_error
 1000 EQUD    &1E6
 1010 EQUS    "Unknown squash operation"
 1020 EQUB    Ø
 1030 ALIGN
 1040 :
 1050 .Exit_Error
 1060 LDMFD   (sp)!,{R1-R11,link}
 1070 ORRS    pc,link,#1<<28
 1080 :
 1090 .OpenFile
 1100 ; RØ->file
 1110 STMFD   (sp)!,{R1-R11,link}
 1120 :
 1130 MOV     R1,#Ø
 1140 STR     R1,[wp,#Input]
 1150 STR     R1,[wp,#Work]
 1160 STR     R1,[wp,#Handle]
 1170 :
 1180 MOV     R1,RØ
 1190 MOV     RØ,#20
 1200 SWI     "XOS_File"
 1210 BVS     ExitOpen
 1220 CMP     RØ,#1
 1230 BEQ     IsFile
 1240 :
 1250 MOV     R2,RØ
 1260 MOV     RØ,#19
 1270 SWI     "XOS_File"
 1280 B       ExitOpen
 1290 .SquashHead
 1300 EQUS    "SQSH"
 1310 .SquashType
 1320 EQUD    &FCA
 1330 .IsFile
 1340 LDR     RØ,SquashType
 1350 CMP     R6,RØ
 1360 BEQ     IsSquash
 1370 :
 1380 .NotSquash
 1390 ADR     RØ,NotSquashErr
 1400 B       Exit_Error
 1410 .NotSquashErr
 1420 EQUD    256
 1430 EQUS    "Not a squashed file"
 1440 EQUB    Ø
 1450 ALIGN
 1460 .IsSquash
 1470 STR     R5,[wp,#attr]
 1480 MOV     RØ,#6
 1490 MOV     R3,#InSize
 1500 SWI     "XOS_Module"
 1510 BVS     ExitOpen
 1520 STR     R2,[wp,#Input]
 1530 :
 1540 MOV     RØ,#&40
 1550 SWI     "XOS_Find"
 1560 BVS     ExitOpen
 1570 CMP     RØ,#Ø
 1580 BLEQ    UnClaim
 1590 BEQ     NotSquash
 1600 STR     RØ,[wp,#Handle]
 1610 :
 1620 LDR     RØ,[wp,#Input]
 1630 MOV     R1,#20
 1640 BL      GetBytes
 1650 BLVS    UnClaim
 1660 BVS     ExitOpen
 1670 :
 1680 LDR     R9,[wp,#Input]
 1690 LDR     RØ,SquashHead
 1700 LDR     R1,[R9,#Ø]
 1710 CMP     RØ,R1
 1720 BEQ     ExitOpen
 1730 :
 1740 BL      UnClaim
 1750 ADR     RØ,NoHeaderErr
 1760 B       Exit_Error
 1770 .NoHeaderErr
 1780 EQUD    256
 1790 EQUS    "Unrecognised squash file"
 1800 EQUB    Ø
 1810 ALIGN
 1820 :
 1830 .ExitOpen
 1840 LDMFD   (sp)!,{R1-R11,pc}
 1850 :
 1860 .SWI_Info
 1870 ; RØ -> filename
 1880 STMFD   (sp)!,{R1,R7-R11,link}
 1890 BL      OpenFile
 1900 BVS     ExitInfo
 1910 :
 1920 LDR     R9,[wp,#Input]
 1930 LDR     R2,[R9,#8]
 1940 LDR     R3,[R9,#12]
 1950 LDR     R4,[R9,#4]
 1960 LDR     R5,[wp,#attr]
 1970 LDR     R6,TestMask
 1980 AND     RØ,R2,R6
 1990 CMP     RØ,R6
 2000 MVNNE   R6,#NOT -1
 2010 LDREQ   R6,TypeMask
 2020 ANDEQ   R6,R2,R6
 2030 MOVEQ   R6,R6,LSR #8
 2040 :
 2050 MOV     RØ,#1
 2060 .ExitInfo
 2070 BL      UnClaim
 2080 :
 2090 LDMFD   (sp)!,{R1,R7-R11,pc}
 2100 .TestMask
 2110 EQUD    &FFFØØØØØ
 2120 .TypeMask
 2130 EQUD    &ØØØFFFØØ
 2140 :
 2150 .SWI_Load
 2160 ; RØ -> filename, [R1=address]
 2170 STMFD   (sp)!,{R1-R11,link}
 2180 :
 2190 BL      OpenFile
 2200 BVS     ExitLoad
 2210 :
 2220 LDR     R9,[wp,#Input]
 2230 MOVS    R4,R1
 2240 LDREQ   R4,[R9,#8]
 2250 :
 2260 MOV     RØ,#%1000
 2270 MOV     R1,#InSize
 2280 SWI     "XSquash_Decompress"
 2290 MOV     R3,RØ
 2300 MOV     RØ,#6
 2310 SWI     "XOS_Module"
 2320 BVS     ExitLoad
 2330 STR     R2,[wp,#Work]
 2340 :
 2350 LDR     R5,[R9,#4]
 2360 MOV     R3,#Ø ; (unused, turned in
to bytes)
 2370 MOV     R8,#Ø ; Ø=start
 2380 .DeLoop
 2390 CMP     R3,#Ø
 2400 BEQ     NoShuffle
 2410 LDR     R1,[wp,#Input]
 2420 ADD     R2,R1,#InSize
 2430 SUB     R2,R2,R3
 2440 MOV     R9,R3
 2450 .shuffle
 2460 LDRB    RØ,[R2],#1
 2470 STRB    RØ,[R1],#1
 2480 SUBS    R9,R9,#1
 2490 BNE     shuffle
 2500 .NoShuffle
 2510 LDR     RØ,[wp,#Input]
 2520 ADD     RØ,RØ,R3
 2530 RSB     R1,R3,#InSize
 2540 BL      GetBytes \ (RØ=notgot)
 2550 MOVS    R9,RØ
 2560 RSB     R3,RØ,#InSize
 2570 :
 2580 MOV     RØ,R8
 2590 ORREQ   RØ,RØ,#%10
 2600 :
 2610 \ RØ = start OR (continue<<1)
 2620 LDR     R1,[wp,#Work]
 2630 LDR     R2,[wp,#Input]
 2640 \ R3 = bytes (=unused on exit)
 2650 \ R4 = output (updated)
 2660 \ R5 = size left (updated)
 2670 SWI     "XSquash_Decompress"
 2680 BLVS    UnClaim
 2690 BVS     Exit_Error
 2700 :
 2710 MOV     R8,#1
 2720 :
 2730 CMP     R9,#Ø
 2740 BEQ     DeLoop
 2750 :
 2760 .ExitLoad
 2770 BL      UnClaim
 2780 :
 2790 LDMFD   (sp)!,{R1-R11,pc}
 2800 :
 2810 .GetBytes
 2820 STMFD   (sp)!,{R1-R4,link}
 2830 MOV     R3,R1
 2840 MOV     R2,RØ
 2850 LDR     R1,[wp,#Handle]
 2860 MOV     RØ,#4
 2870 SWI     "XOS_GBPB"
 2880 MOV     RØ,R3
 2890 LDMFD   (sp)!,{R1-R4,pc}
 2900 :
 2910 .UnClaim
 2920 STMFD   (sp)!,{RØ-R2,link}
 2930 :
 2940 MOV     RØ,#7
 2950 LDR     R2,[wp,#Input]
 2960 CMP     R2,#Ø
 2970 SWINE   "XOS_Module"
 2980 :
 2990 MOV     RØ,#7
 3000 LDR     R2,[wp,#Work]
 3010 CMP     R2,#Ø
 3020 SWINE   "XOS_Module"
 3030 :
 3040 MOV     RØ,#Ø
 3050 LDR     R1,[wp,#Handle]
 3060 CMP     R1,#Ø
 3070 SWINE   "XOS_Find"
 3080 :
 3090 LDMFD   (sp)!,{RØ-R2,pc}^
 3100 :
 3110 .SWI_Save
 3120 ; RØ->filename R1=start R2=end R3-
>filetype or Ø
 3130 STMFD   (sp)!,{R1-R11,link}
 3140 :
 3150 SUBS    R2,R2,R1
 3160 BGT     mem_ok
 3170 :
 3180 ADR     RØ,BadSaveErr
 3190 B       Exit_Error
```

```
3200 .BadSaveErr
3210 EQUD      220
3220 EQUS      "Bad parameters for *Save"
3230 EQUB      0
3240 :
3250 .mem_ok STR     R0,[wp,#FileName]
3260 STR       R1,[wp,#Input]
3270 STR       R2,[wp,#InputSize]
3280 STR       R3,[wp,#attr]
3290 :
3300 MOV       R1,#0
3310 STR       R1,[wp,#Output]
3320 STR       R1,[wp,#Work]
3330 STR       R1,[wp,#Handle]
3340 :
3350 MOV       R0,#%1000
3360 MOV       R1,R2
3370 SWI       "XSquash_Compress"
3380 MOV       R3,R0
3390 MOV       R0,#6
3400 SWI       "XOS_Module"
3410 BVS       ExitSave
3420 STR       R2,[wp,#Work]
3430 :
3440 MOV       R0,#6
3450 MOV       R3,#OutSize
3460 SWI       "XOS_Module"
3470 BVS       ExitSave
3480 STR       R2,[wp,#Output]
3490 :
3500 MOV       R0,#11
3510 LDR       R1,[wp,#FileName]
3520 LDR       R2,SquashType
3530 MOV       R4,#0
3540 MOV       R5,#0
3550 SWI       "XOS_File"
3560 BVS       ExitSave
3570 :
3580 MOV       R0,#&C0
3590 LDR       R1,[wp,#FileName]
3600 SWI       "XOS_Find"
3610 BVS       ExitSave
3620 STR       R0,[wp,#Handle]
3630 :
3640 LDR       R1,[wp,#attr]
3650 CMP       R1,#0
3660 LDREQ     R2,[wp,#Input]
3670 MOVEQ     R3,R2
3680 BEQ       writeheader
3690 :
3700 LDR       R2,[R1]
3710 BIC       R0,R2,#&FF0
3720 BICS      R0,R0,#&00F
3730 BEQ       r2istype
3740 MOV       R0,#31
3750 SWI       "XOS_FSControl"
3760 BVS       ExitSave
3770 .r2istype
3780 MOV       R0,#3
3790 STR       R0,[wp,#time]
3800 MOV       R0,#14
3810 ADD       R1,wp,#time+3
3820 SWI       "XOS_Word"
3830 LDR       R0,[wp,#time]
3840 ORR       R2,R0,R2,LSL #8
3850 ORR       R2,R2,#&FF000000
3860 ORR       R2,R2,#&00F00000
3870 LDR       R3,[wp,#time+4]
3880 :
3890 .writeheader
3900 LDR       R0,SquashHead
3910 LDR       R1,[wp,#InputSize]
3920 MOV       R4,#0
3930 LDR       R9,[wp,#Output]
3940 STMIA     R9,{R0-R4}
3950 MOV       R0,#20
3960 BL        WriteBytes
3970 BVS       ExitSave
3980 :
3990 LDR       R1,[wp,#Work]
4000 LDR       R2,[wp,#Input]
4010 LDR       R3,[wp,#InputSize]
4020 MOV       R9,#0
4030 .CompLoop
4040 MOV       R0,R9
4050 LDR       R4,[wp,#Output]
4060 MOV       R5,#OutSize
4070 SWI       "XSquash_Compress"
4080 BVS       ExitSave
4090 MOV       R9,R0
4100 RSB       R0,R5,#OutSize
4110 BL        WriteBytes
4120 BVS       ExitSave
4130 CMP       R9,#0
4140 MOVNE     R9,#1
4150 BNE       CompLoop
4160 :
4170 .ExitSave
4180 BL        UnClaimSave
4190 :
4200 LDMFD     (sp)!,{R1-R11,pc}
4210 :
4220 .WriteBytes
4230 STMFD     (sp)!,{R0-R3,link}
4240 :
4250 MOV       R3,R0
4260 MOV       R0,#2
4270 LDR       R1,[wp,#Handle]
4280 LDR       R2,[wp,#Output]
4290 SWI       "XOS_GBPB"
4300 :
4310 LDMFD     (sp)!,{R0-R3,pc}
4320 :
4330 .UnClaimSave
4340 STMFD     (sp)!,{R0-R2,link}
4350 :
4360 MOV       R0,#7
4370 LDR       R2,[wp,#Output]
4380 CMP       R2,#0
4390 SWINE     "XOS_Module"
4400 :
4410 MOV       R0,#7
4420 LDR       R2,[wp,#Work]
4430 CMP       R2,#0
4440 SWINE     "XOS_Module"
4450 :
4460 MOV       R0,#0
4470 LDR       R1,[wp,#Handle]
4480 CMP       R1,#0
4490 SWINE     "XOS_Find"
4500 :
4510 LDMFD     (sp)!,{R0-R2,pc}^
4520 :
4530 ]NEXT
4540 ENDPROC
4550 :
4560 DEF FNwp(size)
4570 wp_next+=size
4580 =wp_next-size
```

Listing 9 – CompDemo

```
10 REM >CompDemo (Info9)
20 REM By Brian Cooke
30 REM For RiscOS 3 only
40 REM (C) BAU June 1992
50 :
60 ON ERROR CLOSE #0:PRINTREPORT$;" at line ";ERL:END
70 INPUT"Original file : "in$
80 INPUT"Output file   : "out$
90 output_size=256
100 SYS "OS_File",5,in$ TO type,,load,exec,length
110 SYS "Squash_Compress",%1000,length TO ws_size
120 DIM space length,ws ws_size,output output_size
130 SYS "OS_File",&FF,in$,space
140 PRINT"     input","    Status","  Unused","    Packed","    out/in"
150 input=space
160 togo=length
170 start=0
180 SYS "OS_File",11,out$,&FCA,,0,0
190 out=OPENUP(out$)
200 $output="SQSH"
210 output!4=length
220 output!8=load
230 output!12=exec
240 output!16=0
250 SYS "OS_GBPB",2,out,output,20
260 packed=0
270 REPEAT
280 SYS "Squash_Compress",start,ws,input,togo,output,output_size TO status,,input,togo,,unused
290 SYS "OS_GBPB",2,out,output,output_size-unused
300 packed+=(output_size-unused)
310 PRINT input-space,status,unused,packed,(packed*100) DIV (input-space);"%"
320 start=1
330 UNTIL status=0
340 CLOSE #out
```

Listing 10 – CDown

```
10 REM >CDown (Info10)
20 REM Countdown numbers game solver
30 REM by Richard May
40 REM for all machines
50 REM (c) BAU June 1992
60 :
70 MODE 7
80 VDU 23;&400A;0;0;0;
90 PROCscreen
100 DIM num%(6)
110 DIM n%(6),o$(4),s$(5,1)
120 FOR i%=1 TO 4
130  READ o$(i%)
140 NEXT
150 *FX 15,1
160 REPEAT
170 CLS
180 PROCinit
190 PRINT"Quick or Full search (q/f)? ";
200 REPEAT
210  a$=GET$
220 UNTIL INSTR("QqFf",a$)>0
230 PRINTa$'
240 w%=(INSTR("Ff",a$)=0)
250 TIME=0
260 tm%=0
270 PRINT"Computing method:"'
280 FOR x%=1 TO 3
290 PROCm1
300 IF b%=0 THEN x%=3 ELSE PROCm2
310 NEXT
320 s%=5
330 CLS
340 PRINT"Nearest method: ";b%;" away."'''"Time taken: ";
350 t%=tm% DIV 100
360 IF t%<61 THEN PRINT;t%;" second";:IF t%>1 AND t%<61 THEN PRINT"s" ELSE PRINT
370 IF t%>60 THEN PRINT;t% DIV 60;".";t% MOD 60;" minutes"
380 PRINT
390 FOR i%=1 TO 5
400 PRINT FNop(s$(i%,0));
410 NEXT
420 PRINT'SPC(3);"Press SPACE to continue";
430 *FX 15,1
440 REPEAT UNTIL GET=32
450 UNTIL FALSE
460 :
470 DEF PROCquot
480 PROCread
490 q%=INT(t%/n%+0.5)
500 s%=0
510 PRINT
520 IF x%=2 THEN q%=q%-1 ELSE IF x%=3 THEN q%=q%+1
530 IF q%<2 THEN c$="":ENDPROC
540 c$=FNfind(q%)
550 PRINT FNop(c$);
560 ENDPROC
570 :
580 DEF FNquot2
590 IF c$<>"" THEN PROCdel(c$):=FNop(c$)
600 =""
610 :
620 DEF PROCm1
630 PROCquot
640 IF q%>1 THEN PRINT FNop(STR$(n%)+"*"+STR$(EVAL(c$)));:n%=n%*EVAL(c$)
650 IF q%=0 THEN 730
660 IF b%=0 THEN ENDPROC
670 r%=ABS(t%-n%)
680 IF r%=0 THEN 730
690 b$=FNfind(r%)
700 IF b$<>"" THEN PRINT FNop(b$); ELSE 730
710 IF n%>t% THEN PRINT FNop(STR$(n%)+"-"+STR$(EVAL(b$))); ELSE PRINT FNop(STR$(n%)+"+"+STR$(EVAL(b$)));
720 n%=n%+(EVAL(b$)*SGN(t%-n%))
730 IF b%=0 THEN x%=3
740 ENDPROC
750 :
760 DEF PROCm2
770 FOR z%=1 TO 3
780 s%=0
790 PRINT
800 PROCread
810 IF q%<2 OR c$="" THEN 960
820 IF EVAL(c$)<>q% THEN 960
830 PRINT FNquot2;
840 r%=ABS(t%-EVAL("("+c$+")*"+STR$(n%)))
850 r%=INT(r%/q%+0.5)
860 IF z%=2 THEN r%=r%-1 ELSE IF z%=3 THEN r%=r%+1
870 IF r%=0 THEN 960 ELSE r%=ABS(r%)
880 d$=FNfind(r%)
890 IF d%>0 THEN 960
900 PRINT FNop(d$);
910 IF n%*q%>t% THEN PRINT FNop(STR$(n%)+"-"+STR$(r%));FNop(STR$(n%-r%)+"*"+STR$(q%));:n%=(n%-r%)*q% ELSE PRINT FNop(STR$(n%)+"+"+STR$(r%));FNop(STR$(n%+r%)+"*"+STR$(q%));:n%=(n%+r%)*q%
920 r%=ABS(t%-n%):IF r%=0 THEN 960
930 b$=FNfind(r%):IF b$="" THEN 960
940 PRINT FNop(b$);
950 IF n%>t% THEN PRINT FNop(STR$(n%)+"-"+STR$(EVAL(b$)));:n%=n%-EVAL(b$) ELSE PRINT FNop(STR$(n%)+"+"+STR$(EVAL(b$)));:n%=n%+EVAL(b$)
960  IF b%=0 THEN z%=3:x%=3
970 NEXT
980 ENDPROC
990 :
1000 DEF FNfind(i%)
1010 d%=i%
1020 a$=""
1030 IF FNnos=0 THEN 1770
1040 FOR u%=2 TO 6
1050 IF ABS(i%-n%(u%))<d% THEN a$=STR$(n%(u%)):d%=ABS(i%-n%(u%))
1060 IF d%=0 THEN n%(u%)=0:u%=6
1070 NEXT
1080 IF d%=0 THEN =a$
1090 IF FNnos<2 THEN 1770
1100 FOR k%=1TO4
1110 FOR u%=2TO6
1120 FOR j%=2TO6
1130 IF u%=j% OR n%(u%)=0 OR n%(j%)=0 THEN 1190
1140 n$=STR$(n%(u%))+o$(k%)+STR$(n%(j%))
1150 n=EVAL(n$)
1160 IF n<>INT(n) THEN 1190
1170 IF ABS(i%-n)<d% THEN a$=n$:d%=ABS(i%-n)
1180 IF d%=0 THEN n%(u%)=0:n%(j%)=0:j%=6:u%=6:k%=4
1190 NEXT
1200 NEXT
1210 NEXT
1220 IF d%=0 THEN =a$
1230 IF FNnos<3 THEN 1770
1240 FOR h%=1TO4
1250  FOR k%=1TO4
1260   FOR l%=2TO6
1270    FOR u%=2TO6
1280     FOR j%=2TO6
1290      IF u%=j% OR u%=l% OR l%=j% THEN 1450
1300      IF n%(u%)=0 OR n%(j%)=0 OR n%(l%)=0 THEN 1450
1310      n$=STR$(n%(u%))+o$(k%)+STR$(n%(j%))+o$(h%)+STR$(n%(l%))
1320      n=EVAL(n$)
1330      IF n<>INT(n) THEN 1350
1340      IF ABS(i%-n)<d% THEN a$=n$:d%=ABS(i%-n)
1350      n$="("+STR$(n%(u%))+o$(k%)+STR$(n%(j%))+")"+o$(h%)+STR$(n%(l%))
1360      n=EVAL(n$)
1370      IF n<>INT(n) THEN 1390
1380      IF ABS(i%-n)<d% THEN a$=n$:d%=ABS(i%-n)
1390      IF k%=4 AND n%(j%)=n%(l%) THEN 1440
1400      n$=STR$(n%(u%))+o$(k%)+"("+STR$(n%(j%))+o$(h%)+STR$(n%(l%))+")"
1410      n=EVAL(n$)
1420      IF n<>INT(n) THEN 1440
1430      IF ABS(i%-n)<d% THEN a$=n$:d%=ABS(i%-n)
1440      IF d%=0 THEN n%(u%)=0:n%(j%)=0:n%(l%)=0:j%=6:u%=6:l%=6:k%=4:h%=4
1450     NEXT
1460    NEXT
1470   NEXT
1480  NEXT
1490 NEXT
1500 IF d%=0 THEN=a$
1510 IF FNnos<4 OR w%=TRUE THEN 1770
1520 FOR h%=1 TO 4
1530  FOR k%=1 TO 4
1540   FOR g%=1 TO 4
1550    FOR l%=2 TO 6
1560     FOR u%=2 TO 6
1570      FOR j%=2 TO 6
1580       FOR o%=2 TO 6
1590        IF l%=u% OR l%=j% OR l%=o% OR u%=j% OR u%=o% OR j%=o% THEN 1690
1600        IF n%(u%)=0 OR n%(j%)=0 OR n%(l%)=0 OR n%(o%)=0 THEN 1690
1610        n$=STR$(n%(u%))+o$(k%)+STR$(n%(j%))+o$(h%)+STR$(n%(l%))+o$(g%)+STR$(n%(o%))
1620        n=EVAL(n$)
1630        IF n<>INT(n) THEN 1650
1640        IF ABS(i%-n)<d% THEN a$=n$:d%=ABS(i%-n)
1650        n$="("+STR$(n%(u%))+o$(k%)+STR$(n%(j%))+")"+o$(h%)+STR$(n%(l%))+o$(g%)+STR$(n%(o%))
1660        n=EVAL(n$)
1670        IF n<>INT(n) THEN 1690
1680        IF ABS(i%-n)<d% THEN a$=n$:d%=ABS(i%-n)
1690        IF d%=0 THEN n%(u%)=0:n%(j%)=0:n%(l%)=0:n%(o%)=0:j%=6:u%=6:l%=6:o%=6:k%=4:h%=4:g%=4
1700       NEXT
1710      NEXT
1720     NEXT
1730    NEXT
1740   NEXT
1750  NEXT
1760 NEXT
1770 PROCdel(a$)
1780 =a$
1790 :
1800 DEF PROCdel(a$)
1810 i%=0
1820 z$=""
1830 i%=i%+1
1840 IF INSTR("()*/+-",MID$(a$,i%,1))=0 THEN z$=z$+MID$(a$,i%,1) ELSE PROCremove(VAL(z$)):z$=""
1850 IF i%<LEN(a$) THEN 1830
1860 PROCremove(VAL(z$))
1870 ENDPROC
1880 :
1890 DEF PROCremove(u%)
1900 FOR j%=1 TO 6
1910  IF n%(j%)=u% THEN n%(j%)=0:j%=6
1920 NEXT
1930 ENDPROC
1940 :
1950 DEF PROCread
1960 FOR i%=1 TO 6
1970  n%(i%)=num%(i%)
1980 NEXT
1990 n%=0
2000 u%=0
2010 FOR i%=1 TO 6
2020  IF n%(i%)>u% THEN u%=n%(i%):n%=i%
2030 NEXT
2040 IF u%>n%(1) THEN j%=n%(1):n%(1)=n%(n%):n%(n%)=j%
2050 n%=n%(1)
2060 ENDPROC
2070 :
2080 DEF FNop(a$)
2090 LOCAL i%
2100 IF s%=0 THEN FOR i%=1 TO 5:s$(i%,1)="":NEXT
2110 IF a$="" THEN =""
2120 IF VAL(a$)=EVAL(a$) AND s%<5 THEN =""
2130 FOR i%=1 TO LEN(a$)
2140  IF MID$(a$,i%,1)<>"*" THEN PRINTMID$(a$,i%,1); ELSE PRINT"x";
2150 NEXT
2160 PRINT"=";EVAL(a$)
2170 IF s%=5 THEN =""
2180 s%=s%+1
2190 s$(s%,1)=a$
2200 IF ABS(t%-EVAL(a$))>=b% THEN =""
2210 b%=ABS(t%-EVAL(a$))
2220 FOR i%=1 TO 5
2230  s$(i%,0)=s$(i%,1)
2240 NEXT
2250 tm%=TIME
2260 =""
2270 :
2280 DEF PROCinit
2290 PRINT
2300 FOR i%=1 TO 6
2310  PRINT"Enter number ";i%;":";
2320  INPUT""num%(i%)
2330 NEXT
2340 PRINT'"Enter total:";
2350 INPUT""t%
2360 b%=t%
```

```
2370 PRINT'
2380 ENDPROC
2390 :
2400 DEF FNnos
2410 LOCALi%,u%
2420 FOR u%=2 TO 6
2430  IF n%(u%)>0 THEN i%=i%+1
2440 NEXT
2450 =i%
2460 :
2470 DEF PROCscreen
2480 CLS
2490 VDU 31,0,1,132,157,31,39,1,156,31,
0,2,132,157,147,95
2500 PRINT STRING$(32,"|")"0  "CHR$156
2510 FOR i%=3 TO 20
2520  VDU 31,0,i%,132,157,147,255,135,3
1,35,i%,147,255,32,32,156
2530 NEXT
2540 VDU 31,0,22,132,157,31,39,22,156,3
1,0,21,132,157,147,34
2550 PRINT STRING$(32,"/");"!  ";CHR$15
6
2560 VDU 28,5,19,34,4
2570 ENDPROC
2580 :
2590 DATA +,-,*,/
```

ARM PROGRAMMING

Listing 1

```
10 REM >ARM1 (ArmProg1)
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU June 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .shifttest
130          MOV     R0,#2
140          RSB     R1,R0,R0,LSL #5
150          RSB     R0,R1,R0,LSL #8
160          MOV     R0,R0,LSL #4
170          MOV     pc,link
180 ]NEXT
190 PRINT "Press SPACE to run code";
200 IFGET
210 PRINT '"R0=";USR(shifttest)
```

Listing 2

```
10 REM >ARM2 (ArmProg2)
20 REM By Dave Lawrence
30 REM For 32 bit machines
40 REM (C) BAU June 1992
50 :
60 DIM code 100
70 link=14
80 pc=15
90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .extend
130          MOV     R0,#256 -12 ; -12
in 8 bit
140          MOV     R0,R0,LSL #24
150          MOV     R0,R0,ASR #24
160          MOV     pc,link
170 ]NEXT
180 PRINT "Press SPACE to run code";
190 IFGET
200 PRINT '"R0=";USR(extend)
```

WIRED FOR SOUND

Listing 1 – Wave

```
10 REM > WaveGen1 (Sound1)
20 REM by David Radford
30 REM for Arc only
40 REM (c) BAU May 1992
50 :
60 maxlength%=320*4
70 length%=160
80 DIM buffer% maxlength%*256
90 DIM tb1% 256,tb2% 256
100 same%=TRUE:shaded%=FALSE
110 samplerate%=24
120 *AUDIO ON
130 MODE 12:OFF
140 COLOUR 5,7
150 COLOUR 6,4
160 *POINTER 1
170 PROCinitcode
180 PROCdrawscreen
190 PROCdrawbuttons
200 quit%=FALSE
210 REPEAT
220 REPEAT
230 MOUSE x%,y%,b%
240 UNTIL b%=0
250 REPEAT
260 MOUSE x%,y%,b%
270 UNTIL b%<>0
280 i%=FNicon(x%,y%)
290 IF i%<14 AND shaded% THEN i%=-1
300 CASE i% OF
310 WHEN 0:PROCeditwave(tb1%,688)
320 WHEN 1:PROCeditwave(tb2%,352)
330 WHEN 2,3,4,5,6:PROCsetwave(tb1%,i%
-2,688)
340 WHEN 7,8,9,10,11:PROCsetwave(tb2%,
i%-7,352)
350 WHEN 12:PROCalterlength(-1,1020)
360 WHEN 13:PROCalterlength(1,1172)
370 WHEN 14:PROCplay
380 WHEN 15:PROCsave
390 WHEN 16:PROCload
400 WHEN 17:PROCcommand
410 WHEN 18:MODE12:quit%=TRUE
420 WHEN 19:PROCnewsound
430 ENDCASE
440 UNTIL quit%
450 END
460 :
470 DEF PROCdrawscreen
480 RESTORE +0
490 REPEAT
500 READ xmin%,ymin%,xmax%,ymax%,a$
510 IF a$<>"end" AND ymin%>=300 THEN
520 GCOL 0,6
530 IF a$<>"" THEN RECTANGLE FILL xmin
%+2,ymin%+4,xmax%-4,ymax%-12
540 GCOL 0,5
550 RECTANGLE xmin%,ymin%,xmax%-2,ymax
%-4
560 x%=xmin%+xmax%/2-LEN(a$)*8
570 y%=ymin%+ymax%/2+14
580 MOVE x%,y%:PRINTCHR$5;a$;CHR$4;:OF
F
590 ENDIF
600 UNTIL a$="end"
610 GCOL 0,5
620 MOVE 1068,720:PRINTCHR$5;"Length:"
;CHR$4;:OFF
630 a$=STR$length%:a$=STRING$(4-LENa$,
CHR$32)+a$
640 COLOUR 5:PRINTTAB(68,12);a$;
650 PROCsetwave(tb1%,0,688)
660 PROCsetwave(tb2%,0,352)
670 ENDPROC
680 :
690 DEF PROCdrawbuttons
700 RESTORE +0
710 REPEAT
720 READ xmin%,ymin%,xmax%,ymax%,a$
730 IF a$<>"end" AND ymin%<300 THEN
740 GCOL 0,4
750 RECTANGLE FILL xmin%+2,ymin%+4,xma
x%-4,ymax%-12
760 GCOL 0,7
770 RECTANGLE xmin%,ymin%,xmax%-2,ymax
%-4
780 x%=xmin%+xmax%/2-LEN(a$)*8
790 y%=ymin%+ymax%/2+14
800 MOVE x%,y%:PRINTCHR$5;a$;CHR$4;:OF
F
810 ENDIF
820 UNTIL a$="end"
830 ENDPROC
840 :
850 DEF FNicon(x%,y%)
860 RESTORE +0:i%=-1:j%=0
870 REPEAT
880 READ xmin%,ymin%,xmax%,ymax%,a$
890 IF x%>=xmin% AND x%<xmax%+xmin% AN
D y%>=ymin% AND y%<ymax%+ymin% THEN i%=j
%
900 j%+=1
910 UNTIL a$="end" OR i%<>-1
920 =i%
930 :
940 DATA 32,688,258*2,67*4,""
950 DATA 32,352,258*2,67*4,""
960 DATA 700,900,250,56,"Clear"
970 DATA 700,848,250,56,"Sine wave"
980 DATA 700,796,250,56,"Triangle wave
"
990 DATA 700,744,250,56,"Square wave"
1000 DATA 700,692,250,56,"Saw-tooth wav
e"
1010 DATA 700,564,250,56,"Clear"
1020 DATA 700,512,250,56,"Sine wave"
1030 DATA 700,460,250,56,"Triangle wave
"
1040 DATA 700,408,250,56,"Square wave"
1050 DATA 700,356,250,56,"Saw-tooth wav
e"
1060 DATA 1020,600,48,48,"<"
1070 DATA 1172,600,48,48,">"
1080 DATA 0,188,240,56,"Play sound"
1090 DATA 240,188,240,56,"Save sound"
1100 DATA 480,188,240,56,"Load sound"
1110 DATA 720,188,80,56,"*"
1120 DATA 800,188,240,56,"Quit"
1130 DATA 1040,188,240,56,"New sound"
1140 DATA 0,0,0,0,"end"
1150 :
1160 DEF PROCalterlength(d%,x%)
1170 TIME=0:length%+=d%
1180 REPEAT
1190 MOUSE a%,b%,c%
1200 IF TIME>30 AND (TIME MOD10)<2 THEN
 length%+=d%:IF TIME>200 d%+=SGN(d%)
1210 IF length%<2 THEN length%=2
1220 IF length%>maxlength% THEN length%
=maxlength%
1230 a$=STR$length%:a$=STRING$(4-LENa$,
CHR$32)+a$
1240 COLOUR 5:WAIT:PRINTTAB(68,12);a$;
1250 UNTIL a%<x% OR a%>=x%+48 OR b%<600
 OR b%>=600+48 OR c%=0
1260 recalc%=TRUE
1270 ENDPROC
1280 :
1290 DEF PROCsmallwindow
1300 COLOUR 7:VDU 28,0,31,79,24,12
1310 COLOUR 5,128,128,128
1320 COLOUR 6,0,0,128
1330 COLOUR 1,128,0,0
1340 MOUSE OFF
1350 ENDPROC
1360 :
1370 DEF PROCfullwindow
1380 VDU 12,28,0,31,79,0
1390 IF NOT shaded% THEN
1400 COLOUR 5,7
1410 COLOUR 6,4
1420 COLOUR 1,1
1430 ELSE
1440 COLOUR 5,0
1450 COLOUR 6,0
1460 COLOUR 1,0
1470 ENDIF
1480 MOUSE ON
1490 PROCdrawbuttons
1500 ENDPROC
1510 :
1520 DEF PROCcommand
1530 LOCAL ERROR
1540 PROCsmallwindow
1550 ON ERROR LOCAL PRINT'REPORT$;" (Er
ror &";~ERR;")"
1560 REPEAT
1570 INPUT"*"a$
1580 OSCLI(a$)
1590 UNTIL a$=""
1600 PROCfullwindow
1610 ENDPROC
1620 :
1630 DEF PROCrecalc
1640 IF recalc%=FALSE THEN ENDPROC
1650 recalc%=FALSE
1660 A%=length%
1670 B%=tb1%:C%=tb2%
1680 IF same% THEN C%=B%
1690 CALL calcsamp
1700 ENDPROC
1710 :
1720 DEF PROCsetwave(data%,type%,y%)
1730 IF data%=tb2% AND type%=0 THEN sam
e%=TRUE ELSE IF data%=tb2% THEN same%=FA
LSE
1740 a%=0:b%=2:FOR T%=0 TO 255
1750 CASE type% OF
1760 WHEN 0:data%?T%=0
1770 WHEN 1:data%?T%=127*SIN(RAD(T%/256
*360))
1780 WHEN 2:data%?T%=a%:a%+=b%:IF a%>=1
26 OR a%<=-127 THEN b%=-b%
1790 WHEN 3:IF T%<128 THEN data%?T%=127
 ELSE data%?T%=128
1800 WHEN 4:data%?T%=a%:a%+=1
1810 ENDCASE
1820 NEXT
1830 GCOL 0,0
1840 RECTANGLE FILL 34,y%+4,255*2,64*4
1850 GCOL 0,1
1860 LINE 34,y%+67*2,34+258*2-6,y%+67*2
1870 GCOL 0,5
1880 A%=32:B%=y%:C%=data%:CALL drawwave
1890 recalc%=TRUE
1900 ENDPROC
1910 :
1920 DEF PROCplay
1930 PROCrecalc
1940 !samplerate=samplerate%
1950 !sourceptr=buffer%
1960 IF shaded% THEN !sourcelen=length%
 ELSE !sourcelen=length%*256
1970 CALL playback
1980 ENDPROC
1990 :
2000 DEF PROCeditwave(data%,y%)
2010 IF data%=tb2% THEN same%=FALSE
2020 A%=32:B%=y%:C%=data%
2030 MOUSE RECTANGLE 34,y%+4,255*2,64*4
2040 mousex%=-1:mousey%=-1:olde%=-1
2050 REPEAT
2060 REPEAT
2070 MOUSE a%,f%,c%:a%=a% AND &FFFE:f%=
f% AND &FFFC
2080 UNTIL c%=0 OR mousex%<>a% OR mouse
y%<>f%
2090 IF olde%<>-1 THEN olde%=e%
2100 IF mousex%=a% THEN olde%=-1
2110 mousex%=a%:mousey%=f%
2120 b%=(f%-(y%+33*4))/4
2130 IF b%>32 THEN b%=32 ELSE IF b%<-32
 THEN b%=-32
2140 val%=b%*4:IF val%=128 THEN val%=12
7 ELSE val%=val% AND255
2150 e%=(a%-34)DIV2
2160 x1%=a%-2:x2%=a%+2
2170 IF olde%=-1 THEN
2180 olde%=0
2190 data%?e%=val%
2200 e1%=e%:e2%=e%
2210 ELSE
2220 IF e%>olde% THEN e1%=olde%:e2%=e%:
y2%=val% EOR128:y1%=data%?e1% EOR128:x1%
=a%-(e2%-e1%)*2 ELSE e1%=e%:e2%=olde%:y1
%=val% EOR128:y2%=data%?e2% EOR128:x2%=a
%+(e2%-e1%)*2
2230 k%=2*ABS(y2%-y1%)-(e2%-e1%):j%=y1%
2240 FOR T%=e1% TO e2%:data%?T%=j% EOR1
28
2250 WHILE k%>=0:j%+=SGN(y2%-y1%):k%=k%
-2*(e2%-e1%):ENDWHILE
2260 k%=k%+2*ABS(y2%-y1%):NEXT
2270 ENDIF
2280 IF e1%=0 THEN x1%=a%
2290 IF e2%=255 THEN x2%=a%
2300 GCOL 0,0:RECTANGLE FILL x1%,y%+4,x
2%-x1%,255
2310 GCOL 0,1:LINE x1%,y%+4+128,x2%,y%+
4+128
2320 GCOL 0,5:CALL drawwave
2330 UNTIL c%=0
2340 MOUSE RECTANGLE 0,0,1279,1023
2350 recalc%=TRUE
2360 ENDPROC
2370 :
2380 DEF PROCinitcode
2390 DIM code% 2048
2400 FOR PASS=0 TO 2 STEP 2
2410 P%=code%
2420 [OPT PASS
2430 .drawwave
2440 MOV R5,R0
2450 MOV R6,R1
2460 MOV R7,R2
2470 MOV R0,#4
2480 ADD R1,R5,#2
2490 LDRB R2,[R7],#1
2500 EOR R2,R2,#128
2510 ADD R2,R2,#4
2520 ADD R2,R2,R6
2530 SWI "OS_Plot"
2540 MOV R8,#255
2550 MOV R0,#5
2560 .drawwaveloop
2570 ADD R1,R1,#2
2580 LDRB R2,[R7],#1
2590 EOR R2,R2,#128
2600 ADD R2,R2,#4
2610 ADD R2,R2,R6
2620 SWI "OS_Plot"
2630 SUBS R8,R8,#1
2640 BNE drawwaveloop
2650 MOV PC,R14
2660 :
2670 .mainbufferptr EQUD buffer%
2680 :
2690 .calcsamp
2700 SUB R0,R0,#1
2710 MOV R3,#255
2720 .calcsamploop1
2730 LDR R4,mainbufferptr
2740 ADD R4,R4,R3
2750 MOV R5,R0
2760 LDRB R6,[R2,R3]
2770 EOR R6,R6,#128
2780 LDRB R7,[R1,R3]
2790 EOR R7,R7,#128
2800 SUBS R8,R6,R7
2810 SUBMI R8,R7,R6
2820 MOVPL R9,#1
2830 MVNMI R9,#0
2840 MOVEQ R9,#0
2850 RSB R11,R0,R8,LSL #1
2860 :
2870 .calcsamploop2
2880 EOR R10,R7,#128
2890 STRB R10,[R4],#256
2900 CMP R11,#0
2910 BLT skipcalcsamploop3
2920 .calcsamploop3
2930 ADD R7,R7,R9
2940 SUB R11,R11,R0,LSL #1
2950 CMP R11,#0
2960 BGE calcsamploop3
2970 .skipcalcsamploop3
2980 ADD R11,R11,R8,LSL #1
2990 SUBS R5,R5,#1
3000 BNE calcsamploop2
3010 LDRB R10,[R2,R3]
3020 STRB R10,[R4]
3030 SUBS R3,R3,#1
3040 BPL calcsamploop1
3050 MOV PC,R14
3060 :
3070 .playback
3080 STMFD R13!,{R14}
3090 LDR R0,sourceptr
```




```
3100 LDR R1,sourcelen
3110 ADD R1,RØ,R1
3120 STR R1,sourceend
3130 MOV RØ,#Ø
3140 STR RØ,finished
3150 MOV RØ,#1
3160 MOV R1,#Ø
3170 LDR R2,samplerate
3180 MOV R3,#Ø
3190 MOV R4,#Ø
3200 SWI "Sound_Configure"
3210 ADR R5,oldconfig
3220 STMIA R5,{RØ,R2}
3230 LDR RØ,[R3,#8]
3240 STR RØ,logptr
3250 ADR RØ,voice
3260 MOV R1,#Ø
3270 SWI "Sound_InstallVoice"
3280 TEQ R1,#Ø
3290 ADREQ RØ,error
3300 SWIEQ "OS_GenerateError"
3310 STR R1,voiceslot
3320 MOV RØ,#1
3330 SWI "XSound_AttachVoice"
3340 BVS exit
3350 TEQ RØ,#Ø
3360 BEQ exit
3370 STR R1,oldslot
3380 MOV RØ,#1
3390 MOV R1,#&17Ø
3400 MOV R2,#1ØØ
3410 MOV R3,#1ØØ
3420 SWI "XSound_Control"
3430 :
3440 .playloop
3450 SWI "XOS_ReadEscapeState"
3460 BCS exit
3470 LDR RØ,finished
3480 TEQ RØ,#Ø
3490 BEQ playloop
3500 :
3510 .exit
3520 ADR R5,oldconfig
3530 LDMIA R5,{RØ,R2}
3540 MOV R1,#Ø
3550 MOV R3,#Ø
3560 MOV R4,#Ø
3570 SWI "XSound_Configure"
3580 LDR R1,oldslot
3590 MOV RØ,#1
3600 SWI "XSound_AttachVoice"
3610 LDR R1,voiceslot
3620 SWI "XSound_RemoveVoice"
3630 MOV RØ,#126
3640 SWI "OS_Byte"
3650 LDMFD R13!,{PC}
3660 :
3670 .error EQUD Ø
3680 EQUS "Unable to install voice gene
rator"
3690 EQUB Ø
3700 ALIGN
3710 :
3720 .oldconfig
3730 EQUD Ø
3740 EQUD Ø
3750 .voiceslot EQUD Ø
3760 .oldslot EQUD Ø
3770 :
3780 .voice
3790 B fill
3800 B fill
3810 B fill
3820 B gateoff
3830 LDMFD R13!,{PC}
3840 LDMFD R13!,{PC}
3850 LDMFD R13!,{PC}
3860 EQUD voicename-voice
3870 .voicename
3880 EQUS "TestVoice"
3890 EQUB Ø:ALIGN
3900 :
3910 .gateoff
3920 MOV RØ,#Ø
3930 .gateoffloop
3940 STRB RØ,[R12],R11
3950 STRB RØ,[R12],R11
3960 STRB RØ,[R12],R11
3970 STRB RØ,[R12],R11
3980 CMP R12,R1Ø
3990 BLT gateoffloop
4000 MOV RØ,#1
4010 LDMFD R13!,{PC}
4020 :
4030 .fill
4040 ADR R7,logptr
4050 LDMIA R7,{R3-R5}
4060 .fillbuffer
4070 ]:FOR T%=1 TO 4
4080 [OPT PASS
4090 CMP R4,R5
4100 BGE endofsample
4110 LDRB RØ,[R4],#1
4120 LDRB RØ,[R3,RØ,LSL #5]
4130 STRB RØ,[R12],R11
4140 ]NEXT
4150 [OPT PASS
4160 CMP R12,R1Ø
4170 BLT fillbuffer
4180 STR R4,sourceptr
4190 MOV RØ,#8
4200 LDMFD R13!,{PC}
4210 :
4220 .endofsample
4230 MOV RØ,#Ø
4240 .endofsampleloop
4250 STRB RØ,[R12],R11
4260 CMP R12,R1Ø
4270 BLT endofsampleloop
4280 STR R4,sourceptr
4290 STR R4,finished
4300 MOV RØ,#2
4310 LDMFD R13!,{PC}
4320 :
4330 .logptr EQUD Ø
4340 .sourceptr EQUD buffer%
4350 .sourceend EQUD Ø
4360 .sourcelen EQUD maxlength%*256
4370 .finished EQUD Ø
4380 .samplerate EQUD Ø
4390 ]NEXT
4400 ENDPROC
4410 :
4420 DEF PROCnewsound
4430 COLOUR 5,7
4440 COLOUR 6,4
4450 COLOUR 1,1
4460 shaded%=FALSE
4470 length%=160
4480 samplerate%=24
4490 recalc%=TRUE:PROCdrawscreen
4500 ENDPROC
4510 :
4520 DEF PROCshade
4530 shaded%=TRUE
4540 COLOUR 5,Ø
4550 COLOUR 6,Ø
4560 COLOUR 1,Ø
4570 recalc%=FALSE
4580 ENDPROC
4590 :
4600 DEF PROCload
4610 LOCAL ERROR
4620 PROCsmallwindow
4630 X%=Ø
4640 ON ERROR LOCAL PRINT'REPORT$;" (Er
ror &";~ERR;")":IF X%<>Ø THEN CLOSE#X%:X
%=Ø
4650 ok%=FALSE
4660 REPEAT
4670 INPUT "Enter filename: "f$
4680 IF f$<>"" THEN
4690 X%=OPENINf$
4700 IF X%=Ø THEN PRINT'"Unable to open
file" ELSE PROCloadfile
4710 ENDIF
4720 UNTIL ok% OR f$=""
4730 PROCfullwindow
4740 ENDPROC
4750 :
4760 DEF PROCloadfile
4770 IF EXT#X%-1>maxlength%*256 THEN PR
INT'"Not enough memory for this sample":
CLOSE#X%:X%=Ø:ENDPROC
4780 shaded%=FALSE
4790 length%=16Ø
4800 samplerate%=24
4810 j%=VPOS:VDU28,Ø,31,79,Ø
4820 recalc%=TRUE:PROCdrawscreen
4830 VDU 28,Ø,31,79,24,31,Ø,j%
4840 samplerate%=BGET#X%
4850 length%=EXT#X%-1
4860 SYS "OS_GBPB",4,X%,buffer%,EXT#X%-
1
4870 CLOSE#X%:X%=Ø
4880 IF (length% MOD256)<>Ø OR samplera
te%<>24 THEN PROCshade ELSE PROCloadtabl
es
4890 ok%=TRUE
4900 ENDPROC
4910 :
4920 DEF PROCloadtables
4930 length%=length% DIV 256
4940 A%=buffer%:B%=buffer%+length%*256-
256
4950 FOR T%=Ø TO 255:tb1%?T%=A%?T%:tb2%
?T%=B%?T%:NEXT
4960 A%=Ø:FOR T%=Ø TO 255
4970 IF tb2%?T%=Ø THEN A%+=1
4980 NEXT
4990 IF A%=256 THEN same%=TRUE ELSE sam
e%=FALSE
5000 a$=STR$length%:a$=STRING$(4-LENa$,
CHR$32)+a$
5010 y%=VPOS:VDU 28,Ø,31,79,Ø:COLOUR 5:
PRINTTAB(68,12);a$;
5020 VDU 28,Ø,31,79,24,31,Ø,y%:C%=tb2%
5030 FOR y%=352 TO 688 STEP 688-352
5040 GCOL Ø,Ø
5050 RECTANGLE FILL 34,y%+4,255*2,64*4
5060 GCOL Ø,1
5070 LINE 34,y%+67*2,34+258*2-6,y%+67*2
5080 GCOL Ø,5
5090 A%=32:B%=y%:CALL drawwave:C%=tb1%
5100 NEXT
5110 recalc%=TRUE
5120 ENDPROC
5130 :
5140 DEF PROCsave
5150 LOCAL ERROR
5160 IF shaded% THEN ENDPROC
5170 PROCsmallwindow
5180 X%=Ø
5190 ON ERROR LOCAL PRINT'REPORT$;" (Er
ror &";~ERR;")":IF X%<>Ø THEN CLOSE#X%:X
%Ø
5200 ok%=FALSE
5210 REPEAT
5220 INPUT "Enter filename: "f$
5230 IF f$<>"" THEN
5240 X%=OPENOUTf$
5250 IF X%=Ø THEN
5260 PRINT'"Unable to open file"
5270 ELSE
5280 PROCrecalc
5290 BPUT #X%,samplerate%
5300 SYS "OS_GBPB",2,X%,buffer%,length%
*256
5310 CLOSE#X%:X%=Ø
5320 SYS "OS_File",18,f$,&D3C
5330 ok%=TRUE
5340 ENDIF
5350 ENDIF
5360 UNTIL ok% OR f$=""
5370 PROCfullwindow
5380 ENDPROC
```

Listing 2 – Echo

```
10 REM > Echo (Sound2)
20 REM by David Radford
30 REM for Arc only
40 REM (c) BAU May 1992
50 :
60 DIM code% 4096
70 FOR PASS=Ø TO 2 STEP 2
80 P%=code%
90 [OPT PASS
100 :
110 .echo
120 \ r1 = renew mix
130 \ r2 = sample start
140 \ r3 = sample length
150 \ r4 = buffer start
160 \ r5 = buffer length
170 \ r6 = output mix
180 MOV R8,R4
190 CMP R3,#Ø
200 MOVLE PC,R14
210 MOV RØ,#Ø
220 MOV R9,R5
230 .wipebuffer
240 STR RØ,[R4],#4
250 SUBS R9,R9,#4
260 BNE wipebuffer
270 ADD R5,R8,R5
280 MOV R4,R8
290 RSB R11,R6,#128
300 RSB R12,R1,#128
310 .echoloop
320 LDRB R9,[R2]
330 MOV R9,R9,LSL #24
340 MOV R9,R9,ASR #24
350 MUL R1Ø,R9,R11
360 LDR RØ,[R4]
370 MLA R1Ø,RØ,R6,R1Ø
380 MOV R1Ø,R1Ø,ASR #7
390 STRB R1Ø,[R2],#1
400 MUL R1Ø,R1,R1Ø
410 MLA RØ,R12,RØ,R1Ø
420 MOV RØ,RØ,ASR #7
430 STR RØ,[R4],#4
440 CMP R4,R5
450 MOVGE R4,R8
460 SUBS R3,R3,#1
470 BNE echoloop
480 MOV PC,R14
490 :
500 ]NEXT
510 :
520 INPUT "Source filename: "f$
530 SYS "OS_File",5,f$ TO A%,,,,D%
540 IF A%<>1 THEN D%=4
550 IF (D% MOD 256)=1 THEN D%+=1
560 DIM C% D%
570 C%?(D%-1)=Ø
580 SYS "OS_File",255,f$,C%,Ø
590 INPUT "Echo delay (in kilobytes):
"delay
600 F%=delay*1024*4
610 DIM E% F%
620 INPUT "Percentage of echo in outpu
t: "P%
630 G%=P%*128/100
640 INPUT "Percentage of output to ech
o: "P%
650 B%=P%*128/100
660 C%+=1:D%-=1
670 CALL echo
680 C%-=1:D%+=1
690 INPUT "Destination filename (or RE
TURN for same): "d$
700 IF d$="" THEN d$=f$
710 SYS "OS_File",1Ø,d$,&D3C,,C%,C%+D%
720 END
```

Listing 3 – Fuzz

```
10 REM > Fuzz (Sound3)
20 REM by David Radford
30 REM for Arc only
40 REM (c) BAU May 1992
50 :
60 DIM code% 4096
70 FOR PASS=Ø TO 2 STEP 2
80 P%=code%
90 [OPT PASS
100 :
110 .fuzz
120 \ rØ = start pointer
130 \ r1 = length
140 \ r2 = fuzz level
150 ADD R1,RØ,R1
160 .measurevolume
170 MOV R3,#Ø
180 MOV R4,#256
190 MOV R5,RØ
200 .checkvolume
210 CMP R5,R1
220 MOVGE R6,#Ø
230 LDRLTB R6,[R5],#1
240 EOR R6,R6,#128
250 CMP R6,#128
260 SUBGE R6,R6,#128
270 RSBLT R6,R6,#128
280 CMP R3,R6
290 MOVLT R3,R6
300 SUBS R4,R4,#1
310 BNE checkvolume
320 .adjustvolume
330 MUL R3,R2,R3
340 MOV R3,R3,LSR #7
350 ADD R7,R3,#128
360 RSB R3,R3,#128
370 MOV R4,#256
380 .scalevolume
390 LDRB R6,[RØ]
400 EOR R6,R6,#128
410 CMP R6,R7
420 MOVGT R6,R7
430 CMP R6,R3
440 MOVLT R6,R3
450 EOR R6,R6,#128
460 STRB R6,[RØ],#1
470 CMP RØ,R1
480 MOVGE PC,R14
490 SUBS R4,R4,#1
500 BNE scalevolume
510 B measurevolume
520 ]NEXT
530 :
540 INPUT "Source filename: "f$
550 SYS "OS_File",5,f$ TO A%,,,,l%
560 IF A%<>1 THEN l%=4
570 IF (l% MOD256)=1 THEN l%+=1
580 DIM d% l%+256
590 FOR A%=d%+l%-1 TO d%+l%+255:?A%=Ø:
NEXT
600 SYS "OS_File",255,f$,d%,Ø
610 INPUT "Max level (Ø-128): "C%
620 A%=d%+1:B%=l%-1
630 CALL fuzz
640 INPUT "Destination filename (or RE
TURN for same): "d$
650 IF d$="" THEN d$=f$
660 SYS "OS_File",1Ø,d$,&D3C,,d%,d%+l%
670 END
```

C FOR YOURSELF

Listing 1

```
10 REM >BasKite
20 REM by Andy Gibbons
30 REM for 32-bit machines
40 REM (c) BAU February 1992
50 :
60 MODE 4
70 t=1
80 u=2
90 h=Ø
100 DIM s(34,2)
110 REPEAT
120  CLS
130  h=(h+1) MOD 35
140  MOUSE s(h,1),s(h,2),b
150  CIRCLE s(h,1),s(h,2),2Ø
160  p=h
170  WHILE p<>(h+1) MOD 35
180   x=s(p,1)
190   y=s(p,2)
200   p=(p+34) MOD 35
210   s(p,1)=(s(p,1)+x) DIV 2
220   s(p,2)=(s(p,2)+y) DIV 2-2
230   LINE x,y,s(p,1),s(p,2)
240  ENDWHILE
250  WAIT
260  SYS "OS_Byte",112,t
270  SYS "OS_Byte",113,u
280  SWAP t,u
290 UNTIL FALSE
```

Listing 2

```
/* >c.kite
*
* by Dave Acton
*
* (c) BAU June 1992
*
*/

#include "bbc.h"
#include "os.h"
#include "swis.h"
#include <stdlib.h>

static int s[34][3];

static void swap(int *a,int *b)
{temp=*a ;
  *a=*b;
  *b=temp;
}
```

```
static void wait()
{os_swi1(os_byte ,19);
}

static void mouse(int *a,int *b,int *c)
{os_swi3r(os_mouse ,0,0,0,a,b,c);
}

int main(int argc,char *argv[])
{t ,u,h,p,x,y,b;
  bbc_mode(4);
  t=1;
  u=2;
  h=0;
  while (TRUE) {bbc_cls() ;
    h=(h+1) % 35;
    mouse(&s[h][1],&s[h][2],&b);
    bbc_circle(s[h][1],s[h][2],20);
    p=h;
    while (p!=(h+1) % 35) {x=s[p][1] ;
      y=s[p][2];
      p=(p+34) % 35;
      s[p][1]=(s[p][1]+x)/2;
      s[p][2]=(s[p][2]+y)/2-2;
      bbc_move(x,y);
      bbc_draw(s[p][1],s[p][2]);
    }
    wait();
    os_swi2(OS_Byte,112,t);
    os_swi2(OS_Byte,113,u);
    swap(&t,&u);
  }
}
```

BONUS LISTING – !GRAPH

Listing 1 - MakeSpr

```
   10 REM MakeSp (Bonus1)
   20 REM Make sprites and templates
   30 REM for Graph+
   40 REM (c) BAU June 92
   50 :
   60 file%=OPENOUT "Templates"
   70 REPEAT
   80 READ hex$
   90 IF hex$<>"END" THEN BPUT #file%,EV
AL("&"+hex$)
  100 UNTIL hex$="END"
  110 CLOSE #file%
  120 *SETTYPE Templates Template
  130 :
  140 file%=OPENOUT "!Sprites"
  150 REPEAT
  160 READ hex$
  170 IF hex$<>"END" THEN BPUT #file%,EV
AL("&"+hex$)
  180 UNTIL hex$="END"
  190 CLOSE #file%
  200 *SETTYPE !Sprites Sprite
  210 :
  220 file%=OPENOUT "!RUN"
  230 BPUT #file%,"WimpSlot -Min 128K -M
ax 128K"
  240 BPUT #file%,"Set Graph$Dir <Obey$D
ir>"
  250 BPUT #file%,"IF ""<Font$Path>"" =
"""" THEN ERROR 0 Fonts must be present
before starting !Graph"
  260 BPUT #file%,"RUN <Graph$Dir>.!RunI
mage"
  270 CLOSE #file%
  280 *SETTYPE !Run Obey
  290 PRINT "Templates, !Sprites and !Ru
n created."
  300 PRINT "Now create a directory call
ed !Graph and put"
  310 PRINT "them inside Together with t
he two following listings"
  320 PRINT "which should be saved as !R
unImage"
  330 PRINT "and WimpLib respectivly."
  340 END
  350 :
  360 REM Template data
  370 DATA FF,FF,FF,FF,00,00,00,00,00
  380 DATA 00,00,00,00,00,00,00,74,00
  390 DATA 00,00,D4,01,00,00,01,00,00
  400 DATA 00,49,6E,66,6F,0D,00,00,00
  410 DATA 00,00,00,00,48,02,00,00,5E
  420 DATA 00,00,00,01,00,00,00,47,72
  430 DATA 61,70,68,0D,00,00,00,00,00
  440 DATA 00,A6,02,00,00,C2,00,00,00
  450 DATA 01,00,00,00,73,61,76,65,61
  460 DATA 73,0D,00,00,00,00,00,68,03
  470 DATA 00,00,37,01,00,00,01,00,00
  480 DATA 00,4F,70,74,69,6F,6E,73,0D
  490 DATA 00,00,00,00,00,00,00,00,38
  500 DATA 00,00,00,CC,02,00,00,2A,02
  510 DATA 00,00,D4,03,00,00,00,00,00
  520 DATA 00,00,00,00,00,60,07,00,00
  530 DATA 12,00,01,84,07,02,07,01,03
  540 DATA 01,0C,00,00,00,00,00,00,FC
  550 DATA FF,FF,F4,01,00,00,00,00,00
  560 DATA 00,3D,00,00,00,00,30,00,00
  570 DATA 01,00,00,00,E0,01,00,00,47
  580 DATA 72,61,70,68,20,49,6E,66,6F
  590 DATA 0D,00,0A,00,00,00,0E,00,00
  600 DATA 00,D0,FF,FF,FF,CA,00,00,00
  610 DATA F8,FF,FF,FF,19,00,00,17,47
  620 DATA 72,61,70,68,20,53,69,7A,65
  630 DATA 3A,0D,CA,00,00,00,CC,FF,FF
  640 DATA FF,EC,01,00,00,FC,FF,FF,FF
  650 DATA 3D,61,00,07,98,01,00,00,FF
  660 DATA FF,FF,FF,10,00,00,00,9A,00
  670 DATA 00,00,30,FF,FF,FF,EC,01,00
  680 DATA 00,60,FF,FF,FF,3D,61,00,07
  690 DATA A4,01,00,00,FF,FF,FF,FF,12
  700 DATA 00,00,00,9A,00,00,00,FC,FE
  710 DATA FF,FF,EC,01,00,00,2C,FF,FF
  720 DATA FF,3D,61,00,07,B0,01,00,00
  730 DATA FF,FF,FF,FF,12,00,00,00,0E
  740 DATA 00,00,00,9C,FF,FF,FF,9A,00
  750 DATA 00,00,C4,FF,FF,FF,19,00,00
  760 DATA 17,50,72,6F,67,72,61,6D,3A
  770 DATA 0D,3E,0D,FE,FE,FF,FF,FF,68
  780 DATA FF,FF,FF,9A,00,00,00,90,FF
  790 DATA FF,FF,19,00,00,17,46,75,6E
  800 DATA 63,74,69,6F,6E,3A,0D,0D,FE
  810 DATA 1E,00,00,00,34,FF,FF,FF,9A
  820 DATA 00,00,00,5C,FF,FF,FF,19,00
  830 DATA 00,17,41,75,74,68,6F,72,3A
  840 DATA 0D,64,3E,0D,FE,0E,00,00,00
  850 DATA 04,FF,FF,FF,9A,00,00,00,2C
  860 DATA FF,FF,FF,19,00,00,17,56,65
  870 DATA 72,73,69,6F,6E,3A,0D,3E,0D
  880 DATA FE,9A,00,00,00,64,FF,FF,FF
  890 DATA EC,01,00,00,94,FF,FF,FF,3D
  900 DATA 61,00,07,C0,01,00,00,FF,FF
  910 DATA FF,FF,12,00,00,00,9A,00,00
  920 DATA 00,98,FF,FF,FF,EC,01,00,00
  930 DATA C8,FF,FF,FF,3D,61,00,07,CE
  940 DATA 01,00,00,FF,FF,FF,FF,12,00
  950 DATA 00,00,37,2E,30,22,20,78,20
  960 DATA 36,2E,30,22,0D,4D,69,6B,65
  970 DATA 20,43,75,72,6E,6F,77,0D,31
  980 DATA 2E,31,30,20,28,53,65,70,20
  990 DATA 31,39,39,31,29,0D,47,72,61
 1000 DATA 70,68,20,50,6C,6F,74,74,65
 1010 DATA 72,0D,47,72,61,70,68,0D,04
 1020 DATA 01,00,00,8C,02,00,00,6C,02
 1030 DATA 00,00,F4,03,00,00,00,00,00
 1040 DATA 00,00,00,00,00,64,07,00,00
 1050 DATA 02,00,03,FF,07,02,07,00,03
 1060 DATA 01,0C,00,00,00,00,00,00,FC
 1070 DATA FF,FF,00,05,00,00,00,00,00
 1080 DATA 00,3D,01,00,00,00,00,00,00
 1090 DATA 01,00,00,00,0E,01,0E,01,58
 1100 DATA 00,00,00,FF,FF,FF,FF,00,01
 1110 DATA 00,00,00,00,00,00,47,72,61
 1120 DATA 70,68,0D,84,00,00,00,7C,01
 1130 DATA 00,00,7A,01,00,00,24,02,00
 1140 DATA 00,00,00,00,00,00,00,00,00
 1150 DATA 70,07,00,00,93,00,01,04,07
 1160 DATA 02,07,01,04,0D,02,00,00,00
 1170 DATA 00,00,00,FC,FF,FF,00,05,00
 1180 DATA 00,00,00,00,00,3D,00,00,00
 1190 DATA 00,00,00,00,01,00,00,00,00
 1200 DATA 00,00,00,53,61,76,65,20,61
 1210 DATA 73,3A,0D,3E,0D,0D,03,00,00
 1220 DATA 00,4E,00,00,00,A4,FF,FF,FF
 1230 DATA 8E,00,00,00,EC,FF,FF,FF,02
 1240 DATA 60,00,D7,66,69,6C,65,5F,41
 1250 DATA 46,46,0D,3E,0D,64,0A,00,00
 1260 DATA 00,60,FF,FF,FF,BA,00,00,00
 1270 DATA 90,FF,FF,FF,3D,F1,00,07,B8
 1280 DATA 00,00,00,BE,00,00,00,00,01
 1290 DATA 00,00,C0,00,00,00,60,FF,FF
 1300 DATA FF,EE,00,00,00,90,FF,FF,FF
 1310 DATA 3D,90,01,C7,4F,4B,0D,74,69
 1320 DATA 74,6C,65,64,3E,0D,64,47,72
 1330 DATA 61,70,68,0D,61,7E,20,0D,86
 1340 DATA 00,00,00,3C,01,00,00,86,01
 1350 DATA 00,00,08,02,00,00,00,00,00
 1360 DATA 00,00,00,00,00,44,07,00,00
 1370 DATA 12,00,03,84,07,02,07,01,03
 1380 DATA 01,0C,00,00,00,00,00,2C,FF
 1390 DATA FF,FF,00,01,00,00,00,00,00
 1400 DATA 00,1D,00,00,00,00,30,00,00
 1410 DATA 01,00,00,00,78,00,98,00,4F
 1420 DATA 70,74,69,6F,6E,73,0D,64,3E
 1430 DATA 0D,65,04,00,00,00,0A,00,00
 1440 DATA 00,CC,FF,FF,FF,E6,00,00,00
 1450 DATA FC,FF,FF,FF,13,B1,00,17,D8
 1460 DATA 00,00,00,E3,00,00,00,0B,00
 1470 DATA 00,00,0A,00,00,00,9C,FF,FF
 1480 DATA FF,BA,00,00,00,CC,FF,FF,FF
 1490 DATA 13,B1,00,17,F1,00,00,00,FA
 1500 DATA 00,00,00,09,00,00,00,0A,00
 1510 DATA 00,00,6C,FF,FF,FF,BA,00,00
 1520 DATA 00,9C,FF,FF,FF,13,B1,00,17
 1530 DATA 08,01,00,00,13,01,00,00,0B
 1540 DATA 00,00,00,0A,00,00,00,3C,FF
 1550 DATA FF,FF,D6,00,00,00,6C,FF,FF
 1560 DATA FF,13,B1,00,17,21,01,00,00
 1570 DATA 29,01,00,00,0C,00,00,00,20
 1580 DATA 54,72,75,65,20,53,69,7A,65
 1590 DATA 0D,73,6F,70,74,6F,6E,2C,6F
 1600 DATA 70,74,6F,66,66,0D,20,52,65
 1610 DATA 2D,53,69,7A,65,0D,73,6F,70
 1620 DATA 74,6F,66,66,2C,6F,70,74,6F
 1630 DATA 6E,0D,20,42,61,72,20,47,72
 1640 DATA 61,70,68,0D,73,6F,70,74,6F
 1650 DATA 66,66,2C,6F,70,74,6F,6E,0D
 1660 DATA 20,33,64,20,42,61,72,0D,73
 1670 DATA 6F,70,74,6F,66,66,2C,6F,70
 1680 DATA 74,6F,6E,0D,END
 1690 :
 1700 REM !Sprites data
 1710 DATA 01,00,00,00,10,00,00,00,E4
 1720 DATA 02,00,00,D4,02,00,00,21,67
 1730 DATA 72,61,70,68,00,00,00,00,00
 1740 DATA 00,04,00,00,00,10,00,00,00
 1750 DATA 00,00,00,00,07,00,00,00,2C
 1760 DATA 00,00,00,80,01,00,00,0C,00
 1770 DATA 00,00,77,77,77,77,77,77,77
 1780 DATA 77,77,77,77,77,77,77,77,77
 1790 DATA 77,00,00,00,77,00,00,00,00
 1800 DATA 00,00,00,00,00,00,00,00,00
 1810 DATA 00,00,70,00,00,00,77,00,00
 1820 DATA 00,00,00,00,00,00,00,00,00
 1830 DATA 00,00,00,00,B0,00,00,00,77
 1840 DATA 00,00,00,00,00,00,00,00,00
 1850 DATA 00,00,00,00,00,00,7B,00,00
 1860 DATA 00,77,22,22,22,22,22,22,22
 1870 DATA 22,22,22,22,22,22,22,B2,22
 1880 DATA 00,00,00,77,00,00,00,00,00
 1890 DATA 00,00,00,00,00,00,00,00,00
 1900 DATA 0B,70,00,00,00,77,00,00,00
 1910 DATA 00,00,00,00,00,00,0B,00,00
 1920 DATA 00,B0,00,70,00,00,00,77,00
 1930 DATA 00,00,00,00,00,00,00,B0,B0
 1940 DATA 00,00,00,0B,00,70,00,00,00
 1950 DATA 77,22,22,22,22,22,22,22,22
 1960 DATA 2B,22,BB,22,B2,22,22,22,00
 1970 DATA 00,00,77,00,00,00,0B,00,00
 1980 DATA 00,B0,00,00,00,0B,0B,00,00
 1990 DATA 70,00,00,00,77,00,00,B0,B0
 2000 DATA 0B,00,00,B0,00,00,00,B0,00
 2010 DATA 00,00,70,00,00,00,77,00,00
 2020 DATA 0B,00,B0,0B,00,0B,00,00,00
 2030 DATA 00,00,00,00,70,00,00,00,77
 2040 DATA 22,B2,22,22,22,BB,B2,22,22
 2050 DATA 22,22,22,22,22,22,22,00,00
 2060 DATA 00,77,00,0B,00,00,00,00,0B
 2070 DATA 00,00,00,00,00,00,00,00,70
 2080 DATA 00,00,00,77,B0,00,00,00,00
 2090 DATA 00,00,00,00,00,00,00,00,00
 2100 DATA 00,70,00,00,00,77,0B,00,00
 2110 DATA 00,00,00,00,00,00,00,00,00
 2120 DATA 00,00,00,70,00,00,00,77,77
 2130 DATA 77,77,77,77,77,77,77,77,77
 2140 DATA 77,77,77,77,77,77,00,00,00
 2150 DATA FF,00,00,00,00,00,00,00,00
 2160 DATA 00,00,00,00,00,00,00,00,FF
 2170 DATA FF,FF,FF,00,00,00,00,00,00
 2180 DATA 00,00,00,00,00,00,00,00,00
 2190 DATA 00,FF,FF,FF,FF,00,00,00,00
 2200 DATA 00,00,00,00,00,00,00,00,00
 2210 DATA 00,00,F0,FF,FF,FF,FF,00,00
 2220 DATA 00,00,00,00,00,00,00,00,00
 2230 DATA 00,00,00,00,0F,FF,FF,FF,FF
 2240 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2250 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2260 DATA FF,FF,00,00,00,00,00,00,00
 2270 DATA 00,00,00,00,00,00,00,0F,00
 2280 DATA FF,FF,FF,FF,00,00,00,00,00
 2290 DATA 00,00,00,00,0F,00,00,00,F0
 2300 DATA 00,00,FF,FF,FF,FF,00,00,00
 2310 DATA 00,00,00,00,00,F0,F0,00,00
 2320 DATA 00,0F,00,00,FF,FF,FF,FF,FF
 2330 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2340 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2350 DATA FF,00,00,00,0F,00,00,00,F0
 2360 DATA 00,00,00,0F,0F,00,00,00,FF
 2370 DATA FF,FF,FF,00,00,F0,F0,0F,00
 2380 DATA 00,F0,00,00,00,F0,00,00,00
 2390 DATA 00,FF,FF,FF,FF,00,00,0F,00
 2400 DATA F0,00,00,0F,00,00,00,00,00
 2410 DATA 00,00,00,FF,FF,FF,FF,FF,FF
 2420 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2430 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2440 DATA 00,0F,00,00,00,00,0F,00,00
 2450 DATA 00,00,00,00,00,00,00,FF,FF
 2460 DATA FF,FF,F0,00,00,00,00,00,00
 2470 DATA 00,00,00,00,00,00,00,00,00
 2480 DATA FF,FF,FF,FF,0F,00,00,00,00
 2490 DATA 00,00,00,00,00,00,00,00,00
 2500 DATA 00,00,FF,FF,FF,FF,FF,FF,FF
 2510 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF
 2520 DATA FF,FF,FF,FF,FF,FF,FF,END
```

Listing 2 - !Runimage

```
   10 REM > !RunImage
   20 REM Graph System v1.10
   30 REM © Mike Curnow Sep 1991
   40 REM Line and Symbol extensions by
DNW Jan 1992
   50 LIBRARY"<Graph$Dir>.WIMPLIB"
   60 PROCivar:PROCWimpInit("Graph",&400
)
   70 PROCinitfonts:PROCgf
   80 PROCWimpOT("<Graph$Dir>.Templates"
)
   90 E%=FNWimpLT(b%+800,b%+999,"Options
"):Options%=FNWimpCW(b%)
  100 E%=FNWimpLT(gn%,gn%+256,"Graph"):b
%!44=-ly%:b%!48=lx%:Graph%=FNWimpCW(b%)
  110 E%=FNWimpLT(fn%,fn%+260,"saveas"):
SaveAs%=FNWimpCW(b%)
  120 DIM Infoi% 107:Infosize%=Infoi%:E%
=FNWimpLT(Infoi%,Infoi%+107,"Info"):Info
%=FNWimpCW(b%)
  130 PROCWimpCT
  140 ONERROR PROCWimpStop
  150 ic%=FNIconTask("!Graph")
  160 :
  170 REPEAT
  180 SYS"Wimp_Poll",1,b% TO C%
  190 CASE C% OF
  200 WHEN 1:PROCredrawwin(!b%)
  210 WHEN 2:PROCopenw
  220 WHEN 3:PROCCloseWin(!b%):IF !b%=Gr
aph% go%=FALSE
  230 WHEN 6:PROCCheckMouse(!b%,b%!4,b%!
8,b%!12,b%!16)
  240 WHEN 7:PROCsave
  250 WHEN 9:PROCmenusel
  260 WHEN 17,18:PROCusermsg(b%)
  270 ENDCASE
  280 UNTIL FALSE
  290 :
  300 DEFPROCopenw
  310 sx%=b%!4:sy%=b%!8:IF RS% THEN px=(
b%!12-sx%)/ox:py=(b%!16-sy%)/oy:PROCvar1
:PROCvar2
  320 SYS"Wimp_OpenWindow",,b%:PROCforce
  330 ENDPROC
  340 :
  350 DEFPROCWimpEnd
  360 PROClf:SYS"Wimp_CloseDown"
  370 END
  380 :
  390 DEFPROCmenusel
  400 PROCWimpSelect(b%,m$,B%)
  410 IF m$="Reset Size" THEN px=7:py=5:
PROCcscale
  420 IF LEFT$(m$,5)="Fonts" AND b%!8>-1
 THEN CASE b%!4 OF
  430   WHEN 0:PROCnewfont(axmf,axisfont
,b%!8)
  440   WHEN 1:IF VAL($afi)>0 afsize=VAL
($afi):PROClf:PROCgf:PROCforce
  450   WHEN 2:PROCnewfont(scmf,scalefon
t,b%!8)
  460   WHEN 3:IF VAL($sfi)>0 sfsize=VAL
($sfi):PROClf:PROCgf:PROCforce
  470   WHEN 4:PROCnewfont(timf,titlefon
t,b%!8)
  480   WHEN 5:IF VAL($tfi)>0 tfsize=VAL
($tfi):PROClf:PROCgf:PROCforce
  490   ENDCASE
  500 ENDPROC
  510 :
  520 DEFPROCusermsg(b%)
  530 mc%=b%!16
  540 CASE mc% OF
  550   WHEN 0:PROCCloseWin(Graph%):PROC
WimpEnd
  560   WHEN 2:PROCdosave(TRUE)
  570   WHEN 3:PROCdoload
  580 ENDCASE
  590 ENDPROC
  600 :
  610 DEFPROCCheckMouse(mousex%,mousey%,
B%,handle%,icon%):but%=B%
  620 IF (but%AND2) AND handle%=-2 PROCc
rmenu(0)
  630 IF (but%AND5) AND handle%=Options%
 AND icon%=0 PROCtscale
  640 IF (but%AND5) AND handle%=Options%
 AND icon%=1 PROCrscale
  650 IF (but%AND5) AND handle%=Options%
 AND icon%=2 bar%=(bar%-1)MOD2:IF go% PR
OCvar2:PROCforce
  660 IF (but%AND5) AND handle%=Options%
 AND icon%=3 bar3d%=(bar3d%-1)MOD2:IF go
% PROCvar2:PROCforce
  670 IF (but%AND4) AND handle%=Options%
 PROCWimpClM
  680 IF (but%AND2) AND handle%=Graph% P
ROCcrmenu(1)
  690 IF (but%AND&50) AND handle%=SaveAs
% AND icon%=0 PROCWimpSSave
  700 IF (but%AND5) AND handle%=SaveAs%
AND icon%=2 PROCdosave(FALSE)
  710 ENDPROC
  720 :
  730 DEFPROCcrmenu(T%)
  740 LOCAL @%:@%=&1020104
  750 $Infosize%=STR$(px)+""" x "+STR$(p
y)+""""+CHR$0
  760 $afi=STR$(afsize):afsm=FNWimpMenu(
-1,"$afi(8)","Size:")
  770 $sfi=STR$(sfsize):sfsm=FNWimpMenu(
-1,"$sfi(8)","Size:")
  780 $tfi=STR$(tfsize):tfsm=FNWimpMenu(
-1,"$tfi(8)","Size:")
  790 fontmenu=FNWimpMenu(-1,"Axis Font>
axmf,Axis Font Size>afsm,Scale Font>scmf
,Scale Font Size>sfsm,Title Font>timf,Ti
tle Font Size>tfsm","Fonts:")
  800 M$="Info>Info%,Options>Options%,Fo
nts>fontmenu,Reset Size"
  810 IF T%=0 M$=M$+",Quit" ELSE M$=M$+"
,Save>SaveAs%"
  820 M%=FNWimpMenu(T%,M$,taskn$)
  830 ENDPROC
  840 :
  850 DEFPROCtscale
  860 IF TS% TS%=FALSE ELSE TS%=TRUE
  870 PROCcscale:ENDPROC
  880 DEFPROCrscale
  890 IF RS% RS%=FALSE ELSE RS%=TRUE
  900 PROCcscale:ENDPROC
  910 DEFPROCcscale
  920 PROCvar1:PROClf:PROCgf
  930 IF go% THEN PROCCloseWin(Graph%):P
ROCvar2
  940 IF RS% Y%=2048:X%=2560 ELSE Y%=ly%
:X%=lx%
  950 PROCWimpSE(Graph%,0,-Y%,X%,0)
  960 IF go% PROCOpenWin(Graph%,sx%,sy%,
sx%+sw%,sy%+sh%,0,0,-1):PROCforce
  970 ENDPROC
  980 :
  990 DEFPROCsave
 1000 gn$=FNLeaf(FNGetStr(fn%)):PROCWimp
DoSave(gn$,&AFF)
 1010 ENDPROC
```




```
1020 :
1030 DEFPROCdosave(D%)
1040 IF D% gn$=FNGetStr(b%+44) ELSE gn$=FNGetStr(fn%)
1050 IF INSTR(gn$,".")=0 Z%=FNWimpErr("To save, drag the file icon to a directory viewer"):ENDPROC
1060 LOCALERROR:ONERRORLOCAL:Z%=FNWimpErr(REPORT$):ENDPROC
1070 $gn%=gn$:$fn%=gn$:df%=OPENOUT(gn$):RESTOREERROR
1080 PROCHourOn
1090 BPUT#df%,"Draw";:PROCWout(201):PROCWout(0):BPUT#df%,"Graph       ";
1100 PROCWout(0):PROCWout(0):PROCWout(px*di%):PROCWout(py*di%)
1110 Z%=PTR#df%:PROCWout(0):PROCWout(0):BPUT#df%,1:BPUT#df%,$fonts(axisfont);:BPUT#df%,0:font%(1,3)=1
1120 IF titlefont=axisfont font%(2,3)=1 ELSE BPUT#df%,2:BPUT#df%,$fonts(titlefont);:BPUT#df%,0:font%(2,3)=2
1130 IF scalefont=axisfont font%(3,3)=1 ELSE IF scalefont=titlefont font%(3,3)=2 ELSE BPUT#df%,3:BPUT#df%,$fonts(scalefont);:BPUT#df%,0:font%(3,3)=2:font%(3,3)=3
1140 PROCpad:X%=PTR#df%:PTR#df%=Z%+4:PROCWout(X%-Z%):PTR#df%=X%
1150 PROCdtext(2,adx%+vx/2*di%,(py-0.15)*di%,title$,1)
1160 IF LEN(xaxis$)>0 PROCdtext(1,adx%+vx/2*di%,0.15*di%,xaxis$,1)
1170 L%=LEN(yaxis$):IF L%>0 Y%=ady%+(vy/2+L%/16)*di%:FOR I%=1 TO L%:PROCdtext(1,0.1*di%,Y%-I%*di%/8,MID$(yaxis$,I%,1),1):NEXT
1180 PROCstartg
1190 FOR gr%=1 TO ng%
1200   FOR P%=1 TO nxy%(gr%)
1210     xd=X(d%)-xlo:yd=Y(d%)-ylo:d%+=1
1220     IF bar% THEN PROCsbar ELSE PROCsgraph
1230     first%=FALSE
1240   NEXT
1250   IF bar% THEN PROCsbar2 ELSE IF ln%(gr%)>0 PROCWout(0)
1260   first%=TRUE
1270 NEXT
1280 IF NOT bar% PROCdsymbol
1290 PROCphdr(3,adx%,ady%,di%*px,di%*py,-1,0,256,0):PROCpthm(adx%,aym%):PROCpthd(adx%,ady%):PROCpthd(axm%,ady%):PROCWout(0):REM AXIS
1300 IF xtext%ANDbar% o%=bw/2*di% ELSE o%=0
1310 PROCphdr(xg%*2*(xtext%+1)+yg%*2+nxg%*2+nyg%*2,adx%,ady%,di%*px,di%*py,-1,0,64,0)
1320 X=vx/xg%*di%:Y=vy/yg%*di%:X%=0.04*di%:Y%=0.04*di%:REM Minor grid
1330 IF NOT(xtext%) FOR I%=1 TO xg%:PROCpthm(adx%+X*I%,ady%):PROCpthd(adx%+X*I%,ady%-Y%):NEXT
1340 FOR I%=1 TO yg%:PROCpthm(adx%,ady%+Y*I%):PROCpthd(adx%-X%,ady%+Y*I%):NEXT
1350 X=vx/nxg%*di%:Y=vy/nyg%*di%:X%=0.07*di%:Y%=0.07*di%:REM Major grid
1360 FOR I%=1 TO nxg%:PROCpthm(adx%+X*(I%-xtext%*bar%)+o%,ady%):PROCpthd(adx%+X*(I%-xtext%*bar%)+o%,ady%-Y%):NEXT
1370 FOR I%=1 TO nyg%:PROCpthm(adx%,ady%+Y*I%):PROCpthd(adx%-X%,ady%+Y*I%):NEXT
1380 PROCWout(0)
1390 FOR I%=0 TO nxg%:PROCdtext(3,adx%+X*I%+o%,ady%-0.2*di%,x$(I%),1):NEXT
1400 y=yr/nyg%:FOR I%=0 TO nyg%:PROCdtext(3,adx%-0.1*di%,ady%-1800+Y*I%,STR$(ylo+I%*y),2):NEXT
1410 CLOSE#df%:OSCLI("SETTYPE "+gn$+" AFF")
1420 IF D% PROCWimpAckSave
1430 IF but%AND&44 PROCWimpClM
1440 PROCWimpNewTitle(Graph%):PROCHourSmash
1450 ENDPROC
1460 :
1470 DEFPROCsgraph:LOCAL x,y
1480 x=adx%+xd*xsd:y=ady%+yd*ysd
1490 CASE ln%(gr%) OF
1500   WHEN 0:REM no line
1510   WHEN 1:IF first% THEN PROCphdr(nxy%(gr%),adx%,ady%,axm%,aym%,-1,0,64,0):PROCpthm(x,y):ELSE PROCpthd(x,y):REM segmented line
1520   WHEN 2:XL(P%)=x:YL(P%)=y:IF P%=nxy%(gr%):PROCfit(adx%,ady%,axm%,aym%):PROCphdr(2,adx%,ady%,axm%,aym%,-1,0,64,0):PROCpthm(xstart,ystart):PROCpthd(xend,yend):REM least-squares fit
1530 ENDCASE
1540 ENDPROC
1550 :
1560 DEFPROCsbar
1570 IF first% AND gr%>1 PROCsbar2
1580 IF xd>=xinc*(i%+1) THEN
1590   IF c%>0 d(i%)=d(i%)/c%:c%=0
1600   i%=xd/xinc
1610 ENDIF
1620 c%+=1:d(i%)+=yd
1630 ENDPROC
1640 DEFPROCsbar2:IF c%>0 d(i%)=d(i%)/c%
1650 IF bar3d% THEN
1660   bw3d=bw/4*di%
1670   FOR I%=0 TO i%
1680   x%=adx%+bw*I%*di%+bw3d:y%=ady%+d(I%)*ysd
1690   PROCphdr(4,adx%,ady%,axm%,aym%,&9F9F9F00,0,100,0)
1700   PROCpthm(x%,ady%):PROCpthd(x%,y%):PROCpthd(x%+bw3d*2,y%):PROCpthd(x%+bw3d*2,ady%):PROCWout(0)
1710   PROCphdr(4,adx%,ady%,axm%,aym%,&5F5F5F00,0,100,0)
1720   PROCpthm(x%+bw3d*2,ady%):PROCpthd(x%+bw3d*3,ady%+bw3d):PROCpthd(x%+bw3d*3,y%+bw3d):PROCpthd(x%+bw3d*2,y%):PROCWout(0)
1730   PROCphdr(4,adx%,ady%,axm%,aym%,&BFBFBF00,0,100,0)
1740   PROCpthm(x%,y%):PROCpthd(x%+bw3d,y%+bw3d):PROCpthd(x%+bw3d*3,y%+bw3d):PROCpthd(x%+bw3d*2,y%):PROCWout(0)
1750   NEXT
1760 ELSE
1770   PROCphdr((i%+1)*4,adx%,ady%,axm%,aym%,-1,0,100,0)
1780   FOR I%=0 TO i%
1790   PROCpthm(adx%+bw*I%*di%,ady%):PROCpthd(adx%+bw*I%*di%,ady%+d(I%)*ysd):PROCpthd(adx%+bw*(I%+1)*di%,ady%+d(I%)*ysd):PROCpthd(adx%+bw*(I%+1)*di%,ady%)
1800   NEXT
1810   PROCWout(0)
1820 ENDIF
1830 i%=0:d()=0:c%=0
1840 ENDPROC
1850 :
1860 DEFPROCpad:WHILE PTR#df%AND3:BPUT#df%,0:ENDWHILE:ENDPROC
1870 :
1880 DEFPROCdoload
1890 PROCCloseWin(Graph%):go%=FALSE:xfn$=fn$
1900 fn$=FNGetStr(b%+44):i%=b%!40
1910 IF i%=&FFD OR i%=&FFF ELSE Z%=FNWimpErr(fn$+" is not DATA or TEXT"):ENDPROC
1920 gf%=OPENIN(fn$):PROCHourOn
1930 ln%=0:maxX=-1.7E38:minX=1.7E38:minY=minX:maxY=maxX:ec%=0:numXY%=0
1940 xmin=minX:xmax=maxX:ymax=maxY:ymin=minY:nxy%()=0:PROCstartg
1950 title$=" ":xaxis$="":yaxis$="":xtext%=FALSE:xdiv%=0:ydiv%=0
1960 x$()="":sym%()=0:ln%()=1
1970 REPEAT:PROCGetln:ln%+=1
1980 IF FNgcmd=FALSE THEN
1990   X(d%)=xd:Y(d%)=yd:d%+=1:nxy%(gr%)+=1
2000   IF xd>maxX maxX=xd
2010   IF xd<minX minX=xd
2020   IF yd>maxY maxY=yd
2030   IF yd<minY minY=yd
2040   ENDIF
2050 UNTIL EOF#gf% OR ec%>9 OR d%>Maxdata
2060 CLOSE#gf%
2070 IF ec%>0 fn$="":ENDPROC
2080 ng%=gr%
2090 PROCrnd(minX,xmin,maxX,xmax,xtext%):PROCrnd(minY,ymin,maxY,ymax,FALSE)
2100 PROCvar2:IF fn$<>xfn$ $fn%="Graph"+CHR$0:$gn%="Graph"+CHR$0
2110 PROCOpenWin(Graph%,sx%,sy%,sx%+sw%,sy%+sh%,0,0,-1):PROCforce
2120 ENDPROC
2130 :
2140 DEFPROCstartg:gr%=0:first%=TRUE:n%=0:d()=0:i%=0:c%=0:d%=0:ENDPROC
2150 :
2160 DEFPROCGetln
2170 x$=GET$#gf%:y$=""
2180 I%=INSTR(x$,","):IF I%>0 y$=MID$(x$,I%+1):x$=LEFT$(x$,I%-1)
2190 xd=VAL(x$):yd=VAL(y$)
2200 IF RIGHT$(x$)="""" x$=LEFT$(x$)
2210 IF LEFT$(x$,1)="""" x$=MID$(x$,2)
2220 IF RIGHT$(y$)="""" y$=LEFT$(y$)
2230 IF LEFT$(y$,1)="""" y$=MID$(y$,2)
2240 ENDPROC
2250 :
2260 DEFPROCrnd(RETURN m,RETURN u,RETURN n,RETURN v,text%):LOCAL S%,lm,ln,L%,D%
2270 IF u>m u=m ELSE m=u
2280 IF v<n v=n ELSE n=v
2290 IF text% ENDPROC
2300 D%=INT(LOG(ABS(n-m)))
2310 IF m=0 lm=1<<31 ELSE lm=LOG(ABS(m))
2320 IF n=0 ln=1<<31 ELSE ln=LOG(ABS(n))
2330 IF ln>lm L%=INT(ln) ELSE L%=INT(lm)
2340 PROCrnd2(u,FALSE,lm):PROCrnd2(v,TRUE,ln)
2350 ENDPROC
2360 DEFPROCrnd2(RETURN x,U%,z)
2370 IF x<0 S%=-1:U%=(U%-1)MOD2 ELSE S%=1
2380 x=INT(10^(z-D%)-U%*.99999999)*10^D%*S%
2390 ENDPROC
2400 :
2410 DEFFNgcmd:LOCALc$:c$=FNupp(x$):Z%=TRUE:nv%=2
2420 IF LEFT$(x$,1)="|" THEN =TRUE
2430 CASE c$ OF
2440   WHEN "TITLE":title$=y$
2450   WHEN "XAXIS":xaxis$=y$
2460   WHEN "YAXIS":yaxis$=y$
2470   WHEN "XMIN":xmin=yd
2480   WHEN "XMAX":xmax=yd
2490   WHEN "YMIN":ymin=yd
2500   WHEN "YMAX":ymax=yd
2510   WHEN "XLABEL":PROCgetxtext
2520   WHEN "XDIV":xdiv%=yd
2530   WHEN "YDIV":ydiv%=yd
2540   WHEN "LINE":ln%(gr%)=yd
2550   WHEN "SYMBOL":sym%(gr%)=yd
2560   WHEN "NEWPLOT":first%=TRUE:gr%+=1:n%=0:nv%=1
2570   OTHERWISE:Z%=FALSE:n%+=1:IF gr%=0 gr%=1:sym%(1)=sym%(0):ln%(1)=ln%(0)
2580   ENDCASE
2590 IF y$="" AND nv%>1 THEN Z%=FNWimpErr("Unrecognised data at line "+STR$(ln%)):ec%+=1
2600 =Z%
2610 DEFPROCgetxtext
2620 xdiv%=0:REPEAT
2630 I%=INSTR(y$,","):IF I%>0 x$(xdiv%)=LEFT$(y$,I%-1):y$=MID$(y$,I%+1) ELSE x$(xdiv%)=y$
2640 xdiv%+=1
2650 UNTIL I%=0
2660 xtext%=TRUE:nv%=1
2670 ENDPROC
2680 :
2690 DEFFNupp(x$)
2700 FOR Z%=1 TO LEN(x$):MID$(x$,Z%,1)=CHR$(ASC(MID$(x$,Z%,1))AND&5F):NEXT
2710 =x$
2720 :
2730 DEFPROCforce
2740 SYS"Wimp_ForceRedraw",Graph%,0,0-sh%,sw%,0
2750 ENDPROC
2760 :
2770 DEFPROCredrawwin(h%)
2780 LOCAL f%,i%,w%,x%,y%:!b%=h%
2790 PROCfontscale(osmp):SYS"Wimp_RedrawWindow",,b% TO f%
2800 WHILE f%
2810   x%=(b%!4)-(b%!20):y%=(b%!16)-(b%!24):REM Work Unit Origin
2820   PROCdrawg
2830   !b%=h%:SYS"Wimp_GetRectangle",,b% TO f%
2840 ENDWHILE
2850 PROCfontscale(400):go%=TRUE
2860 ENDPROC
2870 :
2880 DEFPROCdrawg:PROCHourOn
2890 axo%=x%+ax%:ayo%=y%+ay%:REM Axis origin
2900 GCOL0,7:MOVE axo%,ayo%+gy%:DRAWBY 0,-gy%:DRAWBY gx%,0
2910 IF LEN(title$)>0 PROCptext(2,axo%+vx/2*ox,y%-0.15*oy,title$,1)
2920 IF LEN(xaxis$)>0 PROCptext(1,axo%+vx/2*ox,ayo%-0.5*oy,xaxis$,1)
2930 L%=LEN(yaxis$):IF L%>0 Y%=ayo%+gy%/2+L%/2*oy/8:FOR I%=1 TO L%:PROCptext(1,x%+0.1*ox,Y%-I%*oy/8,MID$(yaxis$,I%,1),1):NEXT
2940 PROCstartg
2950 FOR gr%=1 TO ng%
2960   FOR P%=1 TO nxy%(gr%)
2970     xd=X(d%):yd=Y(d%):d%+=1
2980     IF bar% PROCpbar ELSE PROCpgraph
2990     lx=xd:ly=yd:first%=FALSE
3000   NEXT
3010   IF bar% PROCpbar2
3020   first%=TRUE
3030 NEXT
3040 IF xtext%ANDbar% o%=bw/2*ox ELSE o%=0
3050 X=gx%/xg%:Y=gy%/yg%:X%=0.04*ox:Y%=0.04*oy:REM Minor grid
3060 IF NOT(xtext%) FOR I%=1 TO xg%:MOVE axo%+X*I%,ayo%:DRAWBY 0,-Y%:NEXT
3070 FOR I%=1 TO yg%:MOVE axo%,ayo%+Y*I%:DRAWBY -X%,0:NEXT
3080 X=gx%/nxg%:Y=gy%/nyg%:X%=0.07*ox:Y%=0.07*oy:REM Major grid
3090 FOR I%=1 TO nxg%:MOVE axo%+X*(I%-xtext%*bar%)+o%,ayo%:DRAWBY 0,-Y%:NEXT
3100 FOR I%=1 TO nyg%:MOVE axo%,ayo%+Y*I%:DRAWBY -X%,0:NEXT
3110 FOR I%=0 TO nxg%:PROCptext(3,axo%+X*I%+o%,ayo%-0.2*ox,x$(I%),1):NEXT
3120 y=yr/nyg%:FOR I%=0 TO nyg%:PROCptext(3,axo%-0.1*ox,ayo%-8+Y*I%,STR$(ylo+I%*y),2):NEXT
3130 PROCHourSmash
3140 ENDPROC
3150 :
3160 DEFPROCpgraph:LOCAL x,y:x=axo%+(xd-xlo)*xs:y=ayo%+(yd-ylo)*ys
3170 CASE ln%(gr%) OF
3180   WHEN 0:MOVE x,y:PROCsymbol(sym%(gr%),x,y)
3190   WHEN 1:IF first% THEN MOVE x,y:PROCsymbol(sym%(gr%),x,y) ELSE DRAW x,y:PROCsymbol(sym%(gr%),x,y)
3200   WHEN 2:MOVE x,y:PROCsymbol(sym%(gr%),x,y):XL(P%)=x:YL(P%)=y:IF P%=nxy%(gr%) PROCfit(axo%,ayo%,axo%+gx%,ayo%+gy%):LINE xstart,ystart,xend,yend
3210 ENDCASE
3220 ENDPROC
3230 :
3240 DEFPROCpbar
3250 IF xd>=xlo+xinc*(i%+1) THEN
3260   IF c%>0 d(i%)=d(i%)/c%:c%=0
3270   i%=(xd-xlo)/xinc
3280 ENDIF
3290 c%+=1:d(i%)+=(yd-ylo)
3300 ENDPROC
3310 DEFPROCpbar2:IF c%>0 d(i%)=d(i%)/c%
3320 IF bar3d% THEN
3330   bw3x=bw/4*ox:bw3y=bw/4*oy
3340   FOR I%=0 TO i%
3350   SYS"Wimp_SetColour",3:RECTANGLEFILL axo%+bw*ox*I%+bw3x,ayo%,bw3x*2,d(I%)*ys
3360   SYS"Wimp_SetColour",5:MOVE axo%+bw*ox*I%+bw3x*3,ayo%:MOVEBY bw3x,bw3y:PLOT &71,0,d(I%)*ys
3370   SYS"Wimp_SetColour",2:MOVE axo%+bw*ox*I%+bw3x,ayo%+d(I%)*ys:MOVEBY bw3x,bw3y:PLOT &71,bw3x*2,0
3380   SYS"Wimp_SetColour",7:RECTANGLE axo%+bw*ox*I%+bw3x,ayo%,bw3x*2,d(I%)*ys
3390   MOVE axo%+bw*I%*ox+bw3x*3,ayo%:DRAWBY bw3x,bw3y:DRAWBY 0,d(I%)*ys:DRAWBY -bw3x,-bw3y
3400   MOVE axo%+bw*I%*ox+bw3x,d(I%)*ys+ayo%:DRAWBY bw3x,bw3y:DRAWBY bw3x*2,0
3410   NEXT
3420 ELSE
3430   FOR I%=0 TO i%:RECTANGLE axo%+bw*I%*ox,ayo%,bw*ox,d(I%)*ys:NEXT
3440 ENDIF
3450 i%=0:d()=0:c%=0
3460 ENDPROC
3470 :
3480 REM Font, x, y (OS units), text, Align : 0=Left, 1=Mid, 2=Right
3490 DEFPROCptext(f%,x%,y%,t$,a%):LOCAL X%:X%=FNftext(t$,f%)
3500 x%=x%*osmp-(X% DIV2)*a%:SYS"Font_Paint",,t$,0,x%,y%*osmp
3510 ENDPROC
3520 :
3530 DEFPROCWout(w%):LOCAL I%
3540 FOR I%=0 TO3:BPUT#df%,w%:w%=w%>>8:NEXT:ENDPROC
3550 :
3560 REM Draw Path Header
3570 REM No.points,x0,y0,x1,y1,Fill clr,Outline clr,width,style
3580 DEFPROCphdr(n%,x0%,y0%,x1%,y1%,f%,o%,w%,s%)
3590 PROCWout(2):PROCWout(n%*12+24+20)
3600 PROCWout(x0%):PROCWout(y0%):PROCWout(x1%):PROCWout(y1%)
3610 PROCWout(f%):PROCWout(o%):PROCWout(w%):PROCWout(s%)
3620 ENDPROC
3630 REM Path Move
3640 DEFPROCpthm(x%,y%):PROCWout(2):PROCWout(x%):PROCWout(y%):ENDPROC
3650 REM Path Draw
3660 DEFPROCpthd(x%,y%):PROCWout(8):PROCWout(x%):PROCWout(y%):ENDPROC
3670 :
3680 REM Font, x, y, text, Align : 0=Left, 1=Mid, 2=Right
3690 DEFPROCdtext(f%,x%,y%,t$,a%):LOCAL L%,pd%,X%:X%=FNftext(t$,f%)
3700 X%=X%*mpdi:x%-=(X% DIV2)*a%:pd%=font%(f%,1)*640
3710 t$+=CHR$0:L%=(LEN(t$)+3)AND&FFFFFFFC
3720 PROCWout(1):PROCWout(L%+24+28)
3730 PROCWout(x%):PROCWout(y%):PROCWout(x%+X%):PROCWout(y%+pd%)
3740 PROCWout(0):PROCWout(&FFFFFF00):PROCWout(font%(f%,3)):PROCWout(pd%):PROCWout(pd%)
3750 PROCWout(x%):PROCWout(y%):BPUT#df%,t$;:PROCpad
3760 ENDPROC
3770 DEFFNftext(t$,f%):SYS"Font_SetFont",font%(f%,2):SYS"Font_StringBBox",,t$ TO,,,Z%:=Z%
3780 :
3790 DEFPROCgf
3800 PROCfontscale(osmp)
3810 PROCff(axisfont,afsize,1):PROCff(titlefont,tfsize,2):PROCff(scalefont,sfsize,3)
3820 PROCfontscale(400)
3830 ENDPROC
3840 DEFPROCff(n%,p%,f%)
3850 SYS"Font_FindFont",,$fonts(n%),p%*16,p%*16,0,0 TO font%(f%,2):font%(f%,1)=p%:font%(f%,0)=n%
3860 ENDPROC
3870 DEFPROClf:FOR Z%=1 TO 3:SYS"Font_LoseFont",font%(Z%,2):NEXT:ENDPROC
3880 DEFPROCfontscale(X%):SYS"Font_SetScaleFactor",,X%,X%:ENDPROC
3890 DEFPROCivar
3900 sw=8.5:sh=7.25:REM Real screen size in inches (MODE 12)
3910 px=7:py=5:REM Default Graph Physical Height/Width
3920 sx%=0:sy%=200:REM Initial Window posn
3930 Maxdata=2000:REM Max data vars
3940 fn$="":go%=FALSE:@%=&FF000608:TS%=TRUE:RS%=FALSE:bar%=FALSE:bar3d%=FALSE:PROCvar1
3950 DIM fn% 260,gn% 260,nxy%(10),d(100),g%(9,7),x$(30),X(Maxdata),Y(Maxdata)
3960 DIM sym%(10),ln%(10),XL(Maxdata),YL(Maxdata),cf(30),sf(30)
3970 FOR I%=1 TO 16:cf(I%)=COS(I%*PI/8):sf(I%)=SIN(I%*PI/8):NEXT
3980 FOR I%=0 TO 9:FOR J%=0 TO 7:READ g%(I%,J%):NEXT:NEXT
3990 DATA 1,1,1,1,1,1,1,1
4000 DATA 20,10,5,4,2,1,1,1
4010 DATA 20,10,5,4,2,1,1,1
4020 DATA 30,15,10,6,3,2,1,1
4030 DATA 24,20,12,8,4,2,1,1
4040 DATA 25,20,10,5,2,1,1,1
4050 DATA 24,12,6,3,2,1,1,1
4060 DATA 14,7,2,1,1,1,1,1
```

```
4070 DATA 16,8,4,2,1,1,1,1
4080 DATA 18,9,3,1,1,1,1,1
4090 ENDPROC
4100 DEFPROCvar1
4110 IF TS% ox=1280/sw:oy=1024/sh ELSE ox=180:oy=180:REM OS Units Per inch
4120 di%=180*256:REM Draw units per inch
4130 mpdi=di%/72000:REM Conversion for millipoints to draw units
4140 osmp=72000/ox:REM Conversion for OS units to millipoints
4150 vx=px-1:vy=py-1:REM Visible plotted graph size (inches)
4160 lx%=ox*px:ly%=oy*py:REM Total Graph size in OS Units
4170 gx%=ox*vx:gy%=oy*vy:REM Actual graph size (OS units)
4180 ax%=ox*.75:ay%=-(py-.65)*oy:REM Axis Coordinates Relative to work origin
4190 adx%=di%*.75:ady%=di%*.65:axm%=adx%+vx*di%:aym%=ady%+vy*di%:REM Axis Coordinates - Draw units
4200 ENDPROC
4210 DEFPROCvar2:nxg%=0:xg%=0:nyg%=0:yg%=0:xlo=0:xhi=0:ylo=0:yhi=0:xr=0:yr=0
4220 PROCgrid(minX,maxX,xmin,xmax,xlo,xhi,xr,vx,nxg%,xg%,xdiv%)
4230 IF NOT xtext% x=xr/nxg%:FOR I%=0 TO nxg%:x$(I%)=STR$(xlo+I%*x):NEXT
4240 IF nxg%>nval% AND NOT xtext% nval%=nxg%
4250 xinc=xr/nval%:bw=vx/(nval%-xtext%)
4260 PROCgrid(minY,maxY,ymin,ymax,ylo,yhi,yr,vy,nyg%,yg%,ydiv%)
4270 xs=gx%/xr:ys=gy%/yr:REM Scale units
4280 xsd=vx*di%/xr:ysd=vy*di%/yr:REM Scale units Drawfile
4290 sw%=lx%:sh%=ly%:REM Window size
4300 ENDPROC
4310 DEFPROCgrid(m,n,u,v,RETURN a,RETURN b,RETURN r,s,RETURN X%,RETURN Y%,W%):LOCAL f,i
4320 f=(v-u)/(n-m)
4330 IF W%=0 THEN
4340   nval%=FNint(v-u):X%=nval%
4350   I%=0:WHILE g%(X%,I%)>s*2.5*f:I%+=1:ENDWHILE:X%=g%(X%,I%)
4360   i=(v-u)/X%:I%=0:WHILE u+I%*i+i<=m:I%+=1:ENDWHILE:a=u+I%*i
4370   I%=-1:WHILE v-I%*i-i>n:I%+=1:ENDWHILE:b=v-I%*i
4380   r=b-a:X%=r/i
4390 ELSE a=u:b=v:r=b-a:IF bar% nval%=W%-1:X%=W% ELSE nval%=W%-1:X%=W%-1
4400 ENDIF
4410 Y%=FNint(r)*10/X%:IF Y%>9 Y%=Y%/10
4420 i=s/X%*10:IF i<=1 Y%=1 ELSE I%=0:WHILE g%(Y%,I%)>i:I%+=1:ENDWHILE:Y%=g%(Y%,I%)*X%
4430 ENDPROC
4440 DEFFNint(n):LOCALi,Z%
4450 i=LOG(n):Z%=10^(i-INT(i))+0.99999999
4460 IF Z%>=10 =1 ELSE =Z%
4470 :
4480 DEFPROCinitfonts
4490 Maxfont=100:afsize=10:sfsize=8:tfsize=12
4500 DIM font%(3,3),fonts(Maxfont),fontbuf Maxfont*32,axmf 28+24*Maxfont,timf 28+24*Maxfont,scmf 28+24*Maxfont,afi 12,tfi 12,sfi 12
4510 $axmf="Axis Font":axmf!12=&0A070207:axmf!20=44:axmf!24=0
4520 $timf="Title Font":timf!12=&0A070207:timf!20=44:timf!24=0
4530 $scmf="Scale Font":scmf!12=&0A070207:scmf!20=44:scmf!24=0
4540 nfonts=0:F%=0:a%=axmf+28:s%=scmf+28:t%=timf+28:W%=0:p%=fontbuf
4550 axisfont=0:titlefont=0
4560 SYS"Font_ListFonts",,p%,F%,-1 TO ,,F%
4570 WHILE F%>-1
4580   fonts(F%-1)=p%:nfonts+=1:L%=LEN($p%)+1:IF L%>W% W%=L%
4590   !a%=0:a%!4=0:a%!8=&07000121:a%!12=p%:a%!16=-1:a%!20=L%:a%+=24
4600   !s%=0:s%!4=0:s%!8=&07000121:s%!12=p%:s%!16=-1:s%!20=L%:s%+=24
4610   !t%=0:t%!4=0:t%!8=&07000121:t%!12=p%:t%!16=-1:t%!20=L%:t%+=24
4620   IF RIGHT$($p%,6)="Medium" axisfont=F%-1
4630   IF RIGHT$($p%,4)="Bold" titlefont=F%-1
4640   p%+=L%
4650   SYS"Font_ListFonts",,p%,F%,-1 TO ,,F%
4660 ENDWHILE
4670 axmf!16=12+W%*16:timf!16=12+W%*16:scmf!16=12+W%*16
4680 a%!-24=a%!-24 OR &80:s%!-24=s%!-24 OR &80:t%!-24=t%!-24 OR &80
4690 scalefont=axisfont
4700 PROCWimpTick(axmf,axisfont)
4710 PROCWimpTick(scmf,scalefont)
4720 PROCWimpTick(timf,titlefont)
4730 ENDPROC
4740 DEFPROCnewfont(mf,xf%,nf%)
4750 PROCWimpTick(mf,xf%):PROCWimpTick(mf,nf%):PROClf
4760 IF mf=axmf axisfont=nf% ELSEIF mf=scmf scalefont=nf% ELSE titlefont=nf%
4770 PROCgf:PROCforce
4780 ENDPROC
4790 :
4800 DEFPROCsymbol(n%,x,y):LOCAL s():DIM s(3)
4810 s(1)=(gx%+gy%)/200:s(2)=s(1)/1.4:s(3)=s(1)/1.2
4820 CASE n% OF
4830   WHEN 1:MOVE x-s(1),y-s(1)/SQR(3):DRAWBY s(1),s(1)*SQR(3):DRAWBY s(1),-s(1)*SQR(3):DRAWBY -2*s(1),0:MOVEBY s(1),s(1)/SQR(3)
4840   WHEN 2:RECTANGLE x-s(2),y-s(2),2*s(2),2*s(2):MOVEBY s(2),s(2)
4850   WHEN 3:CIRCLE x,y,s(3):MOVEBY -s(3),0
4860   WHEN 4:MOVE x-s(1),y-s(1)/SQR(3):DRAWBY s(1),s(1)*SQR(3):PLOT81,s(1),-s(1)*SQR(3):MOVE x,y
4870   WHEN 5:RECTANGLE FILL x-s(2),y-s(2),2*s(2),2*s(2):MOVE x,y
4880   WHEN 6:CIRCLE FILL x,y,s(3):MOVE x,y
4890 ENDCASE
4900 ENDPROC
4910 :
4920 DEFPROCdsymbol:LOCAL x,y,I%,s():DIM s(3)
4930 d%=0:s(1)=(vx+vy)*180*256/200:s(2)=s(1)/1.4:s(3)=s(1)/1.2
4940 FOR gr%=1 TO ng%
4950   FOR P%=1 TO nxy%(gr%)
4960     xd=X(d%)-xlo:yd=Y(d%)-ylo:d%+=1
4970     x=adx%+xd*xsd:y=ady%+yd*ysd
4980     CASE sym%(gr%) OF
4990     WHEN 0:REM no symbols
5000     WHEN 1:PROCphdr(4,adx%,ady%,axm%,aym%,-1,0,64,0):PROCpthm(x-s(1),y-s(1)/SQR(3)):PROCpthd(x,y+2*s(1)/SQR(3)):PROCpthd(x+s(1),y-s(1)/SQR(3)):PROCpthd(x-s(1),y-s(1)/SQR(3)):PROCWout(0):REM open triangles
5010     WHEN 2:PROCphdr(5,adx%,ady%,axm%,aym%,-1,0,64,0):PROCpthm(x-s(2),y-s(2)):PROCpthd(x-s(2),y+s(2)):PROCpthd(x+s(2),y+s(2)):PROCpthd(x+s(2),y-s(2)):PROCpthd(x-s(2),y-s(2)):PROCWout(0):REM open squares
5020     WHEN 3:PROCphdr(17,adx%,ady%,axm%,aym%,-1,0,64,0):PROCpthm(x+s(3),y):FOR I%=1 TO 16:PROCpthd(x+s(3)*cf(I%),y+s(3)*sf(I%)):NEXT:PROCWout(0):REM open "circles"
5030     WHEN 4:PROCphdr(4,adx%,ady%,axm%,aym%,0,0,64,0):PROCpthm(x-s(1),y-s(1)/SQR(3)):PROCpthd(x,y+2*s(1)/SQR(3)):PROCpthd(x+s(1),y-s(1)/SQR(3)):PROCpthd(x-s(1),y-s(1)/SQR(3)):PROCWout(0):REM filled triangles
5040     WHEN 5:PROCphdr(5,adx%,ady%,axm%,aym%,0,0,64,0):PROCpthm(x-s(2),y-s(2)):PROCpthd(x-s(2),y+s(2)):PROCpthd(x+s(2),y+s(2)):PROCpthd(x+s(2),y-s(2)):PROCpthd(x-s(2),y-s(2)):PROCWout(0):REM filled squares
5050     WHEN 6:PROCphdr(17,adx%,ady%,axm%,aym%,0,0,64,0):PROCpthm(x+s(3),y):FOR I%=1 TO 16:PROCpthd(x+s(3)*cf(I%),y+s(3)*sf(I%)):NEXT:PROCWout(0):REM filled "circles"
5060     ENDCASE
5070   NEXT
5080 NEXT
5090 ENDPROC
5100 :
5110 DEFPROCfit(x0,y0,x1,y1):LOCAL I%,xm,ym,num,denom,xi,yi,m:xm=0:ym=0
5120 FOR I%=1 TO nxy%(gr%):xm=xm+XL(I%):ym=ym+YL(I%):NEXT
5130 xm=xm/nxy%(gr%):ym=ym/nxy%(gr%)
5140 num=0:denom=0:FOR I%=1 TO nxy%(gr%):num=num+(XL(I%)-xm)*(YL(I%)-ym):denom=denom+(XL(I%)-xm)*(XL(I%)-xm):NEXT
5150 m=num/denom
5160 REM Find intersections with boundaries (left, right, bottom, top)
5170 xstart=0:ystart=0:xend=0:yend=0
5180 yi=ym+m*(x0-xm):IF yi>=y0 AND yi<=y1 THEN xstart=x0:ystart=yi
5190 yi=ym+m*(x1-xm)
5200 IF yi>=y0 AND yi<=y1 THEN
5210   IF xstart=0 AND ystart=0 THEN xstart=x1:ystart=yi ELSE xend=x1:yend=yi
5220 ENDIF
5230 xi=(y0-ym)/m+xm
5240 IF xi>x0 AND xi<x1 THEN
5250   IF xstart=0 AND ystart=0 THEN xstart=xi:ystart=y0 ELSE xend=xi:yend=y0
5260 ENDIF
5270 xi=(y1-ym)/m+xm
5280 IF xi>x0 AND xi<x1 THEN xend=xi:yend=y1
5290 ENDPROC
```

Listing 3 - WimpLib

```
10 REM > WimpLib v1.10 : General Wimp Procedures
20 REM © Mike Curnow May 1991
30 DEFPROCWimpInit(n$,S%)
40 SYS"Wimp_Initialise",200,&4B534154,n$+CHR$0
50 DIM b% S%,mb% &400:menufree%=mb%:menuend%=mb%+&400:taskn$=n$
60 ENDPROC
70 :
80 DEFFNIconTask(n$):LOCAL S%,T%
90 S%=OPENIN"<Obey$Dir>.!Sprites":T%=EXT#S%+16:CLOSE#S%:IF S%=0 =0
100 DIM S% T%:!S%=T%:S%!8=16
110 SYS "OS_SpriteOp",&109,S%
120 SYS "OS_SpriteOp",&10A,S%,"<Obey$Dir>.!Sprites"
130 !b%=-1:b%!4=0:b%!8=0:b%!12=S%!32*16+4:b%!16=S%!36*4+4:b%!20=&2102
140 DIM b%!24 (LENn$+1):$(b%!24)=n$:b%!28=S%
150 b%!32=LENn$+1:SYS"Wimp_CreateIcon",,b% TO T%
160 =T%
170 :
180 DEFPROCWimpClM:SYS"Wimp_CreateMenu",,TRUE:ENDPROC
190 :
200 DEFFNWimpMenu(handle%,menu$,menutitle$)
210 IF menufree%+28 > menuend% THEN ERROR 0,"Menu area full"
220 LOCAL h%,i%,m%,w%,y%,item$:h%=4:menuptr%=menufree%
230 $menuptr%=menutitle$
240 menuptr%?12=7:menuptr%?13=2:menuptr%?14=7:menuptr%?15=10
250 menuptr%!20=44:menuptr%!24=0:menuptr%+=28:w%=LENmenutitle$-2
260 REPEAT item$=FNmpar(","):PROCmenuitem(item$):h%+=44:UNTIL item$=""
270 m%=menufree%:m%!16=(w%*8+6)*2:h%-=44
280 IF handle%>=0 THEN
290     IF handle%=0 THEN y%=h%+92 ELSE y%=b%!4+h%
300     SYS"Wimp_CreateMenu",,m%,!b%-64,y%
310     menutop%=m%:menufree%=mb%
320 ELSE menufree%=menuptr%
330 ENDIF
340 =m%
350 :
360 DEFPROCmenuitem(text$)
370 IF text$="" THEN menuptr%!-24=(menuptr%!-24)OR&80:ENDPROC
380 IF menuptr%+24 > menuend% THEN ERROR 0,"Menu area full"
390 LOCALi%,i1%,flg%,subptr%,L%,I%:flg%=&00
400 i%=INSTR(text$,">")
410 IF RIGHT$(text$,1)="#" THEN text$=LEFT$(text$,LENtext$-1):flg%+=&02:h%+=26
420 IFi%>0THENsubptr%=EVALMID$(text$,i%+1):text$=LEFT$(text$,i%-1)ELSEsubptr%=-1
430 menuptr%!0=flg%:menuptr%!4=subptr%:menuptr%!8=&07000021
440 IFLEFT$(text$,1)="$"THEN
450  !menuptr%+=&04
460  menuptr%!8+=&108
470  i%=INSTR(text$,"(")
480  IFi%>0THENL%=VALMID$(text$,i%+1):text$=LEFT$(text$,i%-1)ELSEL%=12
490  menuptr%!12=EVALMID$(text$,2)
500  menuptr%!16=-1:menuptr%!20=L%
510  text$=STRING$(L%," ")
520  REMIF w%<20 THEN w%=20
530 ELSE
540  IFLEFT$(text$,1)="!"THEN
550   text$=RIGHT$(text$,LENtext$-1)
560   !menuptr%+=&08
570  ENDIF
580  IFLENtext$<=12THEN
590   $(menuptr%+12)=text$
600  ELSE I%=FNworkspace(LENtext$+1):$I%=text$
610   menuptr%!12=I%:menuptr%!16=-1:menuptr%!20=LENtext$+1
620   menuptr%!8=menuptr%!8 OR &100
630  ENDIF
640 IFLENtext$>w% THENw%=LENtext$
650 ENDIF
660 menuptr%+=24
670 ENDPROC
680 :
690 DEFFNworkspace(L%):DIM L% L%:= L%
700 :
710 DEFFNmpar(sep$)
720 i1%=i%+1:i%=INSTR(menu$+sep$,sep$,i1%)
730 =MID$(menu$,i1%,i%-i1%)
740 :
750 DEFPROCWimpTick(b%,n%)
760 b%!(28+24*n%)=b%!(28+24*n%)EOR&01
770 ENDPROC
780 :
790 DEFPROCWimpSelect(menus%,RETURN m$,RETURN but%)
800 SYS"Wimp_GetPointerInfo",,b%+64:but%=b%!72
810 SYS"Wimp_DecodeMenu",,menutop%,menus%,STRING$(200," ")TO,,,m$
820 IF m$="" THEN ENDPROC
830 IF m$="Quit" PROCWimpEnd:END
840 ENDPROC
850 :
860 DEFFNWimpErr(t$):LOCAL K%
870 !b%=0:$(b%+4)=t$+CHR$0:SYS"Wimp_ReportError",b%,3,taskn$ TO ,K%
880 =K%
890 :
900 DEFPROCWimpStop:ONERROROFF
910 SYS"Wimp_DragBox",,-1:!b%=ERR
920 IF ERR>52 $(b%+4)=REPORT$+CHR$0 ELSE $(b%+4)=REPORT$+" at line "+STR$ERL+CHR$0
930 SYS"Wimp_ReportError",b%,1,taskn$
940 PROCWimpEnd:END
950 :
960 DEFPROCOpenWin(h%,xl%,yl%,xh%,yh%,xo%,yo%,f%)
970 !b%=h%:b%!4=xl%:b%!8=yl%:b%!12=xh%:b%!16=yh%:b%!20=xo%:b%!24=yo%:b%!28=f%
980 SYS"Wimp_OpenWindow",,b%
990 ENDPROC
1000 :
1010 DEFPROCCloseWin(w%):!b%=w%
1020 SYS"Wimp_CloseWindow",,b%
1030 ENDPROC
1040 :
1050 DEFPROCDelWin(w%):!b%=w%
1060 SYS"Wimp_DeleteWindow",,b%
1070 ENDPROC
1080 :
1090 DEFPROCWimpSE(w%,A%,B%,C%,D%)
1100 !b%=A%:b%!4=B%:b%!8=C%:b%!12=D%:SYS"Wimp_SetExtent",w%,b%
1110 ENDPROC
1120 :
1130 DEFPROCWimpNewTitle(w%)
1140 !b%=w%:SYS"Wimp_GetWindowOutline",,b%
1150 SYS"Wimp_ForceRedraw",-1,b%!4,b%!16-44,b%!12,b%!16
1160 ENDPROC
1170 :
1180 DEFPROCWimpOT(T$)
1190 SYS"Wimp_OpenTemplate",,T$
1200 ENDPROC
1210 DEFPROCWimpCT:SYS"Wimp_CloseTemplate":ENDPROC
1220 DEFFNWimpLT(I%,N%,T$)
1230 SYS"Wimp_LoadTemplate",,b%,I%,N%,TRUE,T$,0 TO ,,N%,,,,I%
1240 IF I%=0 PROCWimpCT:!b%=0:$(b%+4)="Template "+T$+" not found"+CHR$0:SYS"Wimp_ReportError",b%,1,taskn$:PROCWimpEnd:END
1250 =N%
1260 DEFFNWimpCW(b%):LOCAL H%
1270 SYS"Wimp_CreateWindow",,b% TO H%:=H%
1280 :
1290 DEFPROCWimpSSave:LOCAL A%,B%,C%,D%
1300 !b%=SaveAs%:b%!4=0:SYS"Wimp_GetIconState",,b%
1310 b%!32=SaveAs%:SYS "Wimp_GetWindowState",,b%+32
1320 A%=b%!36+b%!8:B%=b%!48+b%!12:C%=b%!36+b%!16:D%=b%!48+b%!20
1330 b%!8=A%:b%!12=B%:b%!16=C%:b%!20=D%
1340 b%!24=0:b%!28=0:b%!32=&7FFFFFF:b%!36=&7FFFFFF
1350 b%!4=5:SYS"Wimp_DragBox",,b%
1360 ENDPROC
1370 DEFPROCWimpDoSave(fn$,T%)
1380 SYS"Wimp_GetPointerInfo",,b%
1390 b%!20=128:b%!32=0:b%!36=1:b%!40=b%!12:b%!44=b%!16:b%!48=!b%:b%!52=b%!4
1400 b%!56=0:b%!60=T%:$(b%+64)=fn$+CHR$0
1410 SYS"Wimp_SendMessage",17,b%+20,b%!40,b%!44
1420 ENDPROC
1430 DEFPROCWimpAckSave:b%!16=3:SYS"Wimp_SendMessage",17,b%,b%!20,b%!24:ENDPROC
1440 :
1450 DEFPROCHourOn:SYS"Hourglass_On":ENDPROC
1460 DEFPROCHourSmash:SYS"Hourglass_Smash":ENDPROC
1470 :
1480 DEFFNGetStr(n%):LOCALn$
1490 IF ?n%<32 =n$
1500 REPEAT:n$+=CHR$(?n%):n%+=1:UNTIL ?n%<32:=n$
1510 DEFPROCPutStr(n$,n%)
1520 n$+=CHR$0:LOCAL I%
1530 FOR I%=1 TO LEN(n$):?n%=ASC(MID$(n$,I%)):n%+=1:NEXT
1540 ENDPROC
1550 :
1560 DEFFNLeaf(n$):LOCALi%
1570 i%=LEN(n$):WHILE i%>0 AND MID$(n$,i%,1)<>".":i%-=1:ENDWHILE
1580 =MID$(n$,i%+1)
```

PUZZLE PAGE

A LITTLE SUM-THING

This puzzle is from *BAU* reader **Ian Gleghorn** of Seaham, Country Durham who receives £20 for his troubles. Consider the small spreadsheet on the right. It consists of four columns A-D and four rows 1-4. In the top left cell is the constant value 3. All the other cells have their values determined by the equations shown. For example, D1 has the value 2*A1 which is 6. What is the value of cell D4? And what number must be entered in place of the 3 at A1 for the value of D4 to be zero?

	A	B	C	D
1	3	B4+C4	(A4+B4)/A3	2*A1
2	A1+D1	A3+C2	A1+2	(B1/C1)+6
3	A1+1	(B1+A4)/C2	D2/C2	C2*(A3+B4)
4	D3-A2-B2	D1-5	(B2/A1)+A3	(D2+C3)/A1

VOWEL TROUBLE

Below is a list of six-letter words. At least, they were six-letters but due to an oversight the vowels have been missed out. As you can see, each word originally contained four vowels, so can you reconstruct them? Short clues are provided.

TP	Paradise	RL	Antenna
RP	Land mass	QT	Balance
GN	Lizard	LS	Negotiate
CC	Flowering plant	DN	Element
NS	Sickness	BG	Dance
NS	Discomfort	LG	Alliance

MAY'S SOLUTIONS

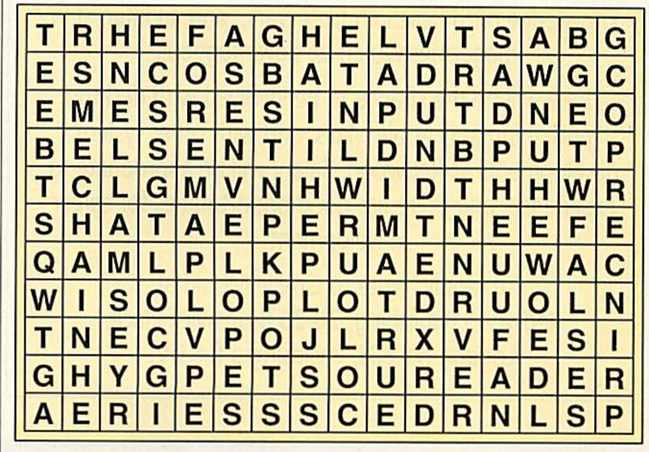
Hex-travaganza

```
(((((&7D + &6A) - &3B) OR &B6) AND &F8) EOR &E4) =
&5C
```

Back-words

RATING from DIGNITARY, SENORA from BARONESS, TARGET from INTEGRATE, FITTER from PRETTIFY, SECEDE from PREDECESSOR, SILAGE from LEGALISE. Other solutions were available.

KEYWORD SEARCH



T	R	H	E	F	A	G	H	E	L	V	T	S	A	B	G
E	S	N	C	O	S	B	A	T	A	D	R	A	W	G	C
E	M	E	S	R	E	S	I	N	P	U	T	D	N	E	O
B	E	L	S	E	N	T	I	L	D	N	B	P	U	T	P
T	C	L	G	M	V	N	H	W	I	D	T	H	H	W	R
S	H	A	T	A	E	P	E	R	M	T	N	E	E	F	E
Q	A	M	L	P	L	K	P	U	A	E	N	U	W	A	C
W	I	S	O	L	O	P	L	O	T	D	R	U	O	L	N
T	N	E	C	V	P	O	J	L	R	X	V	F	E	S	I
G	H	Y	G	P	E	T	S	O	U	R	E	A	D	E	R
A	E	R	I	E	S	S	S	C	E	D	R	N	L	S	P

How many Basic keywords can you find in the grid above? They may run in a straight line in any direction including diagonally. We found 40 - how did you get on?

BBC ACORN USER CRYPTIC CROSSWORD

Across

1,5 Ernie's choice? (6,6)
9 What holds up those wonderful buildings? (15)
11 Stuck in the slammer? Use Samson's tricks! (5)
13 Treasurer loses royal pouch (5)
14 Alternative keyword (4)
16 Mother vessel? (6)
17 Mushy peas found in church recess (4)
19 Uniform made from material of questionable quality (5)
20 "Cash on delivery, egghead! ...or it gets broken!" (4)
21 Let those in class know (6)
23 Process 1 part in 18 (4)
25 It's unpleasant and not totally legal! (5)
27 Short verse rhymes (5)
29 Might this help learner face menu structure? (9,6)
30 Pity about road worker... (6)
31 ...worker who met horrible end on motorway after starting to hum song! (6)

Down

2 Shorthand? Habsolutely! (9)
3 A game with runs (5)
4 Use Macintoshes occasionally for such homework (5)
5 Indifferent, heartless, nervy? (6)
6 To offend or "end up inside" is a mistake (5)
7 A track for climbing up (6)
8 The key to freedom (6)
10 Looking back, Jools Holland debuted in this! (4)
12 "10+10" stretches spaceman to limit (6)
14 Arm oneself in a fit of pique (5)
15 Section of span over railway is a smooth curve (6)
18 Carelessly reproduce section of program (9)
20 Heads meeting (often around tables) (6)
22 I hold game up to set course (6)
23 Slanderous comment found in musical work (4)
24 To serve all your Masters' needs? (6)
26 AU's number? (5)
27 A definite thank-you letter (5)
28 Respond to touching performance (5)

Send your entries to *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ to reach us by Friday June 12 1992. Photocopies of your solution are acceptable. The solution (and winner) will be published in the August issue. The winner of April's crossword (answer shown right) is Mr Prinner of Millon. Chambers English Dictionary, 1988 edition, is recommended.



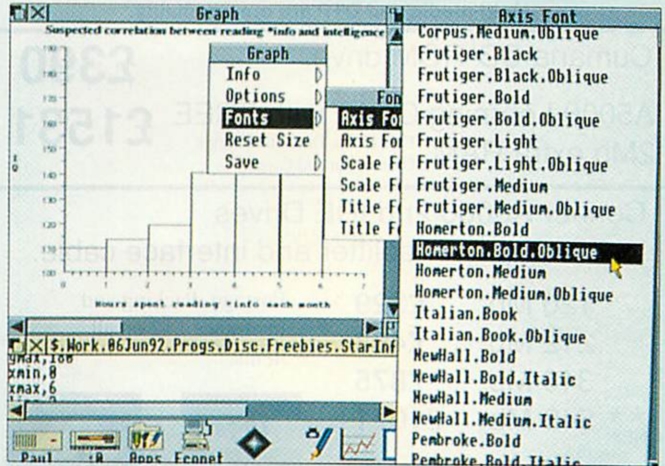


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VISION ON

Your video or television screen can be an abundant source of images. Malcolm Brown takes a look at two digitisers for the Archimedes

A video digitiser is perhaps the ultimate input device for an Archimedes. With its high resolution display and powerful number crunching abilities, the Arc is perfectly suited to image manipulation, not to mention the fun of adding TV scenes, or shots of friends and family, into your *Paint* files.

A video digitiser will take a TV screen image and convert it to a form suitable for display and manipulation on a computer. It does with live video signals what a scanner does for photographs. However, unlike scanners, video digitisers are pretty simple affairs, without the need for expensive optics, paper feed and so on, providing a way into image input that is immensely affordable.

A digitiser can 'grab' frames from most video sources into memory and display them on the screen to be stored, printed, or manipulated like any other sprite. Of course, any video digitiser requires a source of video signals to digitise. You cannot simply connect up your TV aerial to a digitiser because it requires a different kind of video signal. However, pictures from broadcast TV can be grabbed by using a video recorder: most models have a composite video output of one kind or another. Satellite TV receivers, on the other hand, produce exactly the right composite video signals for grabbing pictures 'off air'.

Both of these methods are fine for a while, but you are still at the mercy of the broadcasters and can only grab what they provide. The ideal solution is to invest in a video camera of some kind and the watchword here is quality – the better the camera is, the better the digitised images will be, whether you are talking about colour or monochrome cameras and we will examine some of the options in more details later on.

The digitiser itself samples the video signal at high speed, storing a value equivalent to the brightness at that point in the Archimedes' memory, for display on the screen. The quality of the grabbed image depends on the resolution of the stored image and the number of grey shades, or colours, available for each pixel.

Of course, just as important as the hardware is the software which drives it and makes use of the images obtained. The usual technique is to convert the video images into sprites, monochrome or colour, alter them using an art package such as *Paint* and finally use them – for instance in a desktop publishing package.

To see this in action, we tested out two digitisers for the Archimedes. Vision is the latest mono digitiser from HCCS and Vidi is a colour digitiser from Rombo.

VIDI £149

The Vidi card is a colour video digitiser. All this means is that it grabs three frames one after the other, looking only at the red, green and blue content in turn. But this does require extra circuitry and puts the price of the Vidi up to £149.

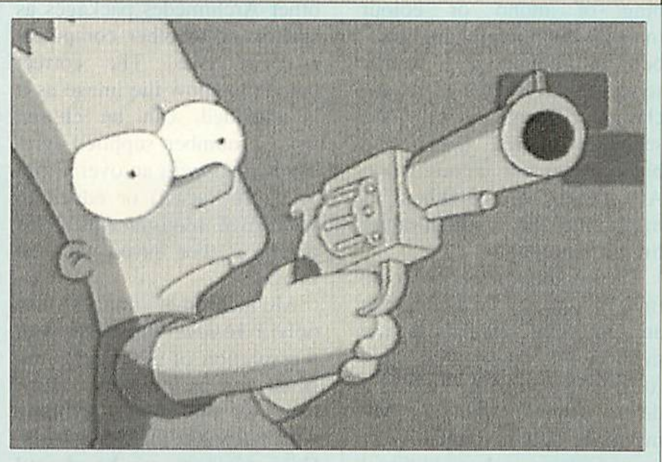
However, it is still simple to fit and use. This is a half-width podule which fits into any empty slot. The card produces no message on a *Podules command, but a blank line on the listed expansions proves that all is well.

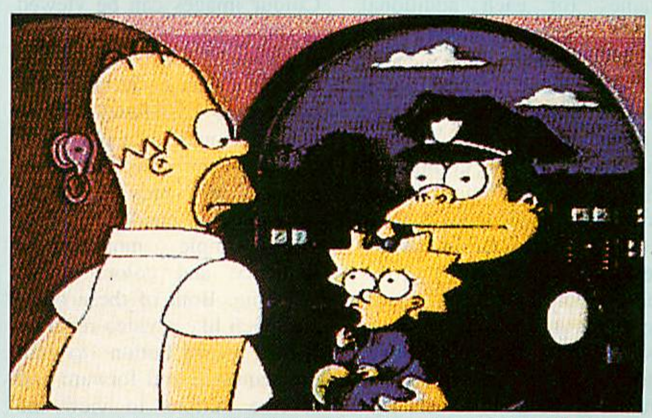
At the rear of the podule are three controls for brightness, saturation (colour) and contrast. It must be said that the saturation control seemed to have little effect on the signal when the review module was tried. Also on the back panel are two input sockets – a phono connector for composite video and an S-VHS terminal – and a trigger socket (for external triggering of the frame-grabbing process).

The advantage of the S-VHS terminal is largely theoretical. Little difference in the quality of grabbed images was found when feeding the two sockets. The board is well made, the only small problem being the special side pieces, which must be bolted on to the Archimedes case.

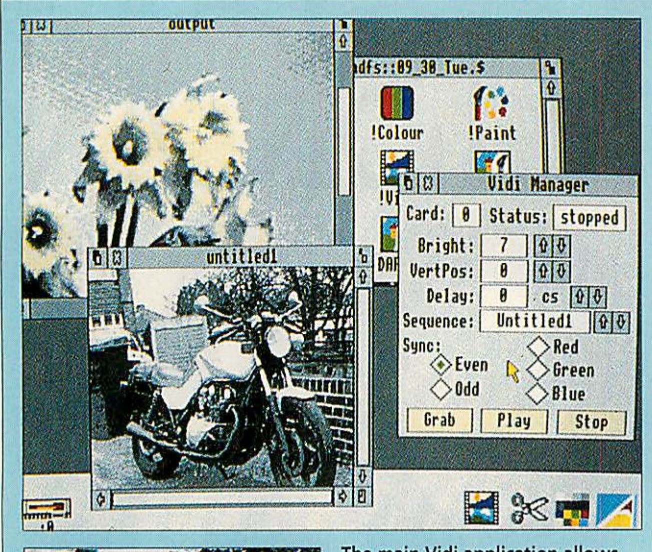
The software for the Vidi card is on two disks. The first has three applications – *Vidi*, *BVidi* and *Colour* – a complete System directory with three special *Vidi* modules, some pre-prepared palettes and some examples sprites. The second disk contains a slideshow program for displaying your grabbed frames and further

VISION & VIDI





Vision (top picture) and Vidi (lower picture) are two digitisers that can work with the Archimedes. Vision works in mono, whereas Vidi is colour, but both can grab images of either a video or satellite TV screen





The main Vidi application allows manipulation of image brightness and the colour palette (above). BVidi and Colour (left), both written in Basic, are designed to operate in a similiar way to video recorders, and provide Vidi with simple monochrome sequence and colour image grabbing

examples. The *Vidi* application is the heart of the system. This allows quite a sophisticated level of control over the grabbing of mono or colour images. All images are grabbed in sequences – either sequences over time of monochrome images or the sequence of red, green and blue images for colour work. All images are grabbed as mode nine sprites which rather limits their quality.

The number of monochrome images, that can be grabbed at any one time, depends on the memory in your Arc but, roughly, you can fit around a dozen frames into a 1Mb machine and a further 21 frames for each additional megabyte that is added on to your machine.

Colour sequences will always consist of just five frames – the image you see, the three colour component images and the output image created from them.

The *Vidi* application opens a desktop window which allows the brightness of the image to be manipulated from software, as shown in the shot above, either odd or even interlaced frames to be grabbed and single colour component frames to be grabbed. Brightness can also be altered using the hardware controls on the card's back panel.

Grabbed frames can be saved to disk or exported to other Archimedes packages as sprites, or to other computers as Tiff files. The correct palette to show the image as it is intended, can be chosen from a number supplied (giving images with an overall tint or a grey scale) or edited to your own requirements. This palette is then saved with the image.

Monochrome images use only a 16-level greyscale with a resolution of 320×256 – too small for real quality. Much better is the colour grabbing with 640×256 in 256 colours. Colour images can be viewed in their red, green and blue component form or as the complete image. Indeed, you can regrab individual components to 'touch up' a picture.

The other two digitiser applications provided take over the Archimedes and provide simple monochrome sequence and colour image grabbing. Both of these operate much like a video recorder with a record button to grab the sequence and forward and reverse buttons to view the next or last frame in a sequence.

There's also a brightness control, a magnifying function and you can select one frame of a sequence or one component of a colour image. The *Vidi* package provides a complete range of control for the Vidi hardware, from the complex *Vidi* application program right down to the SWI calls that you can use for writing your own software (the *BVidi* and *Colour* applications are, in fact, only Basic programs themselves).

With the motivation, there is not much that the Vidi card cannot do, but the results are not always as wonderful as the examples given on the disks. This can usually be put down to the lighting of a live subject – which is always difficult to get just right – or just the basic quality limitations of video recordings.

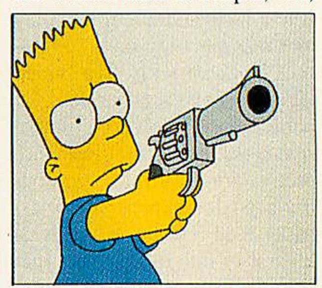
Monochrome grabbed images are slightly disappointing but, with a good video signal, the Vidi digitiser provides an excellent source of quick, high quality and, above all, fun colour graphics for any Archimedes user.

VISION £49

Vision is both a simple product and a remarkably cheap one. Using this card, it is quite possible, with a bit of hunting around, to put together a complete camera and digitiser package for about £100.

The Vision card is a half-width podule and it doesn't have a lot on it – but apparently there's enough. This digitiser only works in mono and a single phono socket on the back panel lets in the composite video signal.

The software supplied with the Vision card is simple, too,



Vision can produce a colour picture. Simply trace around the original sprite using Draw, then add your own colour to the image

with the bare minimum supplied on one disk. One application, *Vision*, is all that is provided, apart for the manual supplied on disk as well.

The application produces a desktop window showing the video signal, continually grabbed at a rate of about once a second. The image is grabbed by selection from a menu and

CONNECTIONS

The different video signals are to be found on different equipment in different sockets. Composite video signals are available from video recorders, camcorders and closed-circuit TV cameras, either on phono sockets or Scart sockets. Scart sockets also provide video in connections and stereo audio conections (both in and out) but these do not concern their connection to video digitisers.

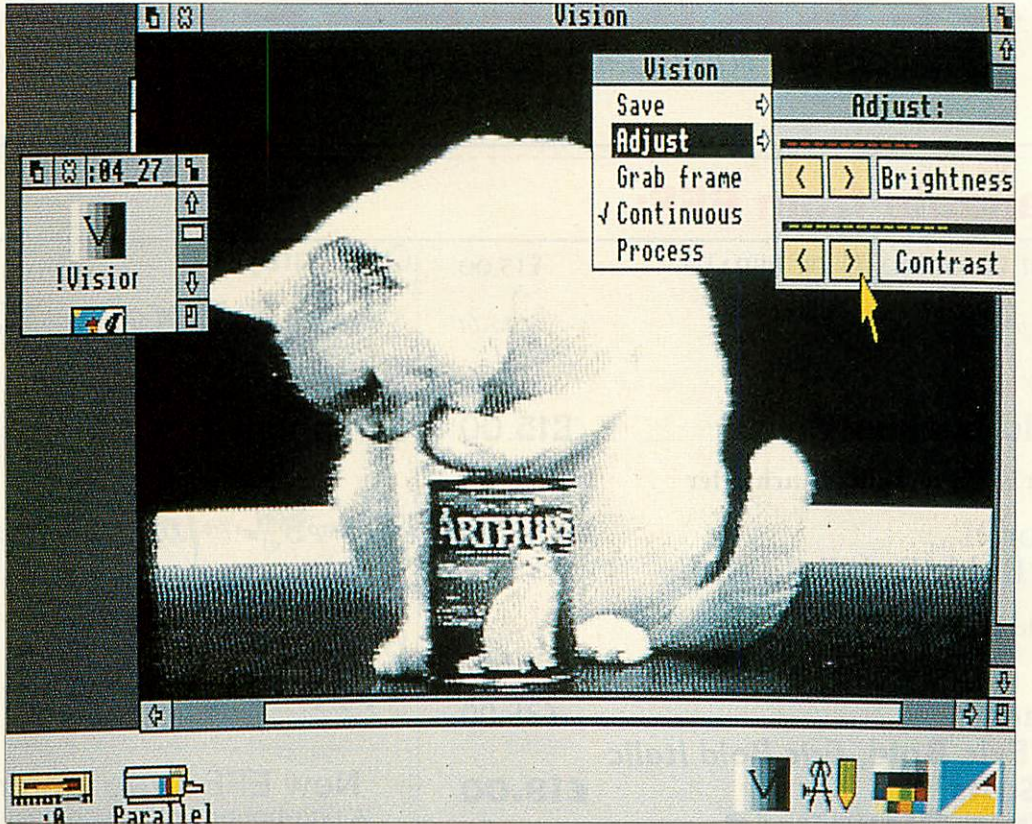
The S-VHS signals of chrominance and luminance are found on certain top end TVs, S-VHS video recorders and S-VHS or Hi-8 camcorders. The S-VHS sockets is standard across all this equipment. Digitisers usually have either phono or BNC sockets to input composite video or an S-VHS terminal for these signals. Leads to connect your equipment to the digitiser are easily made up according to the pinouts of the common output sockets given.

SCART: COMPOSITE VIDEO, VIDEO GROUND, RED, RED GROUND, GREEN, GREEN GROUND, BLUE, BLUE GROUND

PHONO: COMPOSITE VIDEO, GROUND

S-VHS: CHROMINANCE, LUMINANCE, CHROMINANCE GROUND, LUMINANCE GROUND, GROUND

A few digitisers can also take RGB signals. These are found on a few items of specialised equipment (certain MAC satellite receivers, for example) either as separate sockets for each component (often phonos or BNC sockets) or on special sockets such as the monitor socket found on the Archimedes or on the standard Scart socket.



Vision comes with one software package that does everything

VIDEO SIGNALS

There are many sorts of video signal which any video equipment, including a digitiser, might have to cope with. These are best considered in the order that they are met, as they arrive 'off air' on their way to your TV screen.

Picked up by your TV aerial (and indeed by a satellite dish) is a modulated PAL signal. This contains all the picture and sound information on a carrier frequency which you tune your TV (or satellite receiver) to. This signal is not suitable for digitisers.

Your TV demodulates this to give a composite PAL video signal. This contains all the picture information and is the same kind of signal that most mono computer monitors use, except the TV picture is, of course, in colour.

Next, the TV separates this into its separate components of picture brightness (luminance) and colour (chrominance). This signal combination is of the type used by S-VHS camcorders and S-terminal TVs.

Lastly, these signals are combined and separated to give the three signals directly controlling the red, green and blue 'guns' in your TV. Such RGB signals are used in most high-resolution computer displays (including the Archimedes).

It is these last separated components which are stored in the Arc's Ram when a picture is digitised. The further down this chain you produce, store or sample the signals, the better the quality of the image as less processing is performed on it.

this operation is itself rather unpredictable. Because of the amount of time that the computer spends attending to the image, the task involved in getting the right image is rather tricky – by the time you see the scene that you want on screen, and the software has responded to the mouse, the moment has gone.

Brightness and contrast are controlled from software with the same menu and the continuous image is displayed in a low resolution form – for speed! When grabbed, this is converted to a higher quality 640×250, 256-greyscale sprite and it must be said that the results are pretty impressive. Even from standard VHS videos, useful images are simple to grab.

One problem is that the Vision card misses off a small portion of the top of the 'broadcast' picture. However, this rarely really matters to the final image. The final sprite can then be saved to disk in the normal way and exported to applications for art, DTP or whatever. The attraction of Vision is its simplicity. This is also part of its downfall. There is no information on how to use the podule in your own programs, or in any other way than the straightforward application that's supplied.

However, HCCS does promise a module to enable users to operate the podule with *commands and SWIs. This will be available at a nominal extra cost. Also promised soon is a colour upgrade for this monochrome board.

Even in this simple form, the Vision board has a lot to recommend it. The quality of images produced is good – not of photographic standard but that's largely down to the constraints of the video source. This is about as good as you're likely to get on the Archimedes. What's more, there is no denying the cheapness of this product.

For this money you can afford to take a gamble – especially when the odds are so heavily in your favour.

WHAT CAMERA?

Using your own video camera is one way to guarantee control over the images that you use, regardless of the type of digitiser. In fact many Archimedes owners will already have a reasonably high quality video camera – a domestic camcorder can produce the right signals for connection to a digitiser. Recorded or live shots can then be fed from the camcorder to the digitiser in the same way as those from a video recorder.

If you don't have a camcorder, monochrome closed-circuit TV cameras can be bought quite cheaply. These are usually used for watching the front door from a back room, and the like.

Look through the ads in hobby electronics magazines, such as *Electronics Today International*. Secondhand and surplus stock surveillance cameras from the likes of Bull Electrical and RTVC can also make good video sources for Archimedes digitisers and these can typically cost around £80 a time.

For this review, a NV-S7B S-VHS camcorder was used along with a secondhand surveillance camera (picked up for £55) and an assortment of domestic VHS VCRs and satellite TV receivers.

Whatever the video source – off air TV, satellite, tapes or camera – a video digitiser opens up a whole new world of graphical input for the Archimedes.

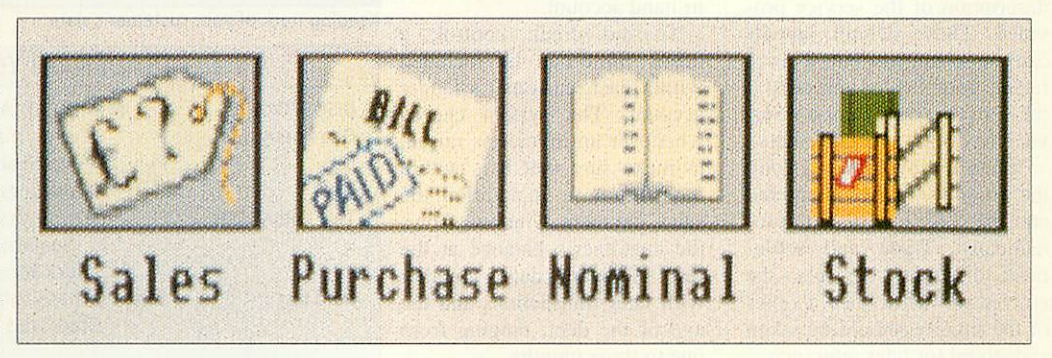
PRODUCT DETAILS

Product: Vision
Supplier: HCCS
Address: 575-583 Durham Road, Engine Lane, Low Fell, Gateshead, Tyne and Wear NE9 5JJ
Tel: 091-487 0760
Price: £49 (£59 for A3000 external podule)
Machines: All Archimedes, BBC A3000

Product: Vidi-Archimedes
Supplier: Rombo
Address: Baird Road, Livingston, Scotland EH54 7AZ
Tel: (0506) 466601
Price: £149
Machines: All Archimedes, BBC A3000

TRADING PLACES

Sales, purchase and nominal ledgers, plus stock control, all come into the domain of Micro Trader. Roy Smith audits the latest all-in business solution for the Archimedes



New business packages are a rare event in the Acorn world and so it was refreshing to hear that Pres was launching a newcomer in this field. However, *Micro Trader* is not a completely fresh face, but rather an suite of programs based on Pres' original packages. Now it has been adapted to take full advantage of Risc OS.

Micro Trader is made up of four modules: Sales Ledger, Purchase Ledger, Nominal Ledger and Stock Control. Also on the way are two additional modules called Mailer, available in the near future, and Payroll, which is still under development.

Each module can be used as a stand-alone application or with the other modules. If used collectively, the modules are fully integrated so when an entry is made in one module, *Micro Trader* will fill in the appropriate entries in another module, in keeping with the double entry book-keeping system. In addition, if the entire system is used, then full VAT accounting is available and the Nominal Ledger module provides the facility for the production of a Trial Balance, a profit & loss account and a balance sheet.

MULTI-TASKING

The modules take full advantage of the Risc OS multitasking facilities and it is possible to have many windows open simultaneously on the screen and move from one operation to another. All four modules fit onto one floppy disc and so the system will operate without disc-swapping. Pres claims that it will multi-task on any Archimedes, including the A3000, and only 1Mb of Ram is needed.

In modes 12, 15 and 20, some of the windows are almost as large as the screen. Although you can use the conventional back icon, you cannot actually adjust the window size. For multi-tasking, windows have to be dragged off the screen. However multiwindows are possible in mode 102, or something similar.

All printing is done through the Risc OS printer drivers and the various accounts and documents can be viewed using *Edit* or a DTP application.

When you Select the MicroTrader icon, the control panel will appear, providing access to all the different modules. The working date is the current date by default, but by clicking on the Working Date box a dialogue appears enabling the date to be changed. The same batch number is allocated to each transaction in one session – a session being defined as every time the computer is switched on or the working date is changed. It is useful for locating small groups of items and for cross-referencing.

The Final box is used for the end of year procedures and the Maintain box allows you to changes the VAT rate, details of the person using the system and security information.

By clicking on the appropriate icon, such as Sales Ledger, and then extending the arrow on the Transactions option, a further dialogue box appears offering several choices. A click on the appropriate item will then throw up a window and the function can be performed – such as preparing and printing an invoice or credit note, recording a cash sale, entering a payment, preparing and printing a statement or making an adjustment. A similar approach is used throughout, making the whole system almost entirely menu-driven.

BUSINESS USERS

If a user merely needs to prepare invoices and statements, it could be possible to use the Sales Ledger in isolation. However, to make use of the double entry system, the Nominal Ledger is needed. This can provide a record of cash received, enabling a cash-up procedure and an analysis of sales. However, many small to medium businesses will require the additional benefits

Sales Account

1003 | Browse | Find | Account details:-

R.J. Smith & Co.
Long Lane
Westbury
Avon
BS20 8RR

Statement period start: 1
Settlement Disc: 0 %
Settlement Period: 30 days
Total balance: 569.51
Credit Limit: 2,000.00

3 Months:-	2 Months:-	1 Month:-	Cur. Month:-
569.51	0.00	0.00	0.00

Cancel | Update | New Acc | Delete | Print | OK

Inside the sales ledger

provided by the whole four-module system.

Although there are too many functions to describe each module in detail, the general philosophy of the system can be shown using the Sales Ledger, assuming that the other four modules are in use.

INSIDE THE MODULE

Two default formats are available for sales invoices: one is designed for businesses that sell items from stock and wish to use the Stock Control facility, while the other is aimed at those that need to include a description of the service provided. These default layouts can be changed, but it is a rather complicated process – the Pres Product Support Service may offer assistance here.

When an invoice is set out, the account number is entered and the VAT calculated automatically. Trade and settlement discounts can also be entered on the invoice. Copies of the invoice should be taken and stored for later reference.

So how does this relate to Stock Control? Well, by entering the stock number on the invoice, complete details of the item, including the VAT code, are located in the Stock Control. These details are then put into the invoice and recorded in Stock Control.

The double-entry of the transaction is achieved by the next stage. If you enter the Nominal Account income account number – having charged the customer the net total of the invoice – the income account is credited and the Sales Ledger Control accordingly debited.

Credit notes are produced in a similar way; the only difference, naturally enough, is that the double-entry automatic postings to the Stock Control and the Nominal Ledger are reversed. Like sales invoices, copies of the credit notes must be retained and filed.

As far as cash sales are concerned, no invoice is needed, so the cash is posted to the appropriate income account in the Nominal Ledger and recorded on the Stock Control. However, if the Nominal Ledger is not installed, no record of the cash sale is kept – this can be overcome by raising an invoice, with the transaction recorded in the Sales Ledger in a special cash sales account. Any cash that is received is credited to the customer and then posted to the Sales Ledger control, where it is added to the cash-in-hand account.

To aid credit control, a credit limit can be included within each customer's ledger account. The system checks whenever an invoice is raised, to make sure that it is within the given limit. In addition, the sales payment window shows the customer's balance at the last statement date, together with later transactions and the age of the debt, ranging from one to three months.

No date information appears in the Sales Payment window (or, for that matter, the purchases payment window). The entries are made with the default date which, if not adjusted, is the date on which the entry is made. If another date is required, the working date option on the control panel has to be changed. All other working windows show the date, with the option available to change this before making the entry.

Statements should be printed on a regular basis, at the period end. You have the choice of sending them to individual customers or to all customers with an outstanding balance. The period that the statement covers is defined whenever you set up a new customer account.

An important part of the program is a facility to make corrections but there are only eight characters supplied for recording the reason for the correction. One way around this that is suggested by Pres, is to enter an opposite transaction to cancel out the incorrect one. You can then re-enter a correct version.

Credit Sale Invoice
Account: 1003 Browse Find — Nominal: 149 Browse Find
Name: R.J. Smith & Co., Long Lane, Westbury, Avon, BS20 8RR — Name: ACCOUNT SALES
Invoice No: 337
Customer's Order No:
Invoice Date: 13.03.92
It Code | Description | Qty | Value | Dis | Net Amount | V
Discounts:- Trade: 0 % 0.00 Settlement: 0 % 0.00
Totals:- Goods: 0.00 Vat: 0.00 Invoice: 0.00
Cancel — Cash received — OK

Keeping track of your customer's slate

MICRO TRADER ON YOUR MACHINE

DISC STORAGE	NUMBER OF ACCOUNTS
One floppy disc	Sales/purchase 700, Nominal 250, Stock lines 1,000
Two floppy discs	Sales/purchase 1,500, Nominal 250, Stock lines 4,000
Hard disc	Sales/Purchase/nominal unlimited, Stock lines 99,999

Micro trader can cope with an annual turnover of £21 million, 9,999 transactions per month, and offers ten variable VAT rates

REPORTS

This type of application needs to be capable of providing reports at the drop of a hat and, *Micro Trader* duly complies, by offering a selection of reports: details of all of the accounts, audit trails, account reports giving all transactions for a specified customer, aged debtors – which gives all Sales Ledger Accounts showing break down in periods of age and 'good' debts – and finally, all customer statements.

Once every calendar month, the period end routine must be run after a routine back-up. A printer is essential for this operation. It prints out an audit trail of all stored transactions, then a listing of all accounts showing opening and closing of balances and transactions for each account. This listing is very important and should be kept on file and stored safely as it is an essential record for commercial, legal and audit purposes.

The reason I have stressed the need for both a back-up and a hard copy, is down to the nature of the Period End routine. Transactions relating to the current month are retained on disc, whereas all other transactions are deleted. So any enquiries about the deleted period will need to be referred back to the hard listing.

The Purchase Ledger details of purchases of goods or services for resale or use in the business and expenses that are paid for against an invoice (on credit). Expenses paid for in cash are normally posted direct to the appropriate account in the Nominal Ledger.

The Purchase Ledger, like the Sales Ledger, interacts automatically with the Stock Control and the Nominal Ledger. A purchase invoice can be allocated to any stock or expense account (including acquisitions of assets) and then sub-divided into departments or categories.

However, only whole invoices can be allocated, not part invoices so, if you need an

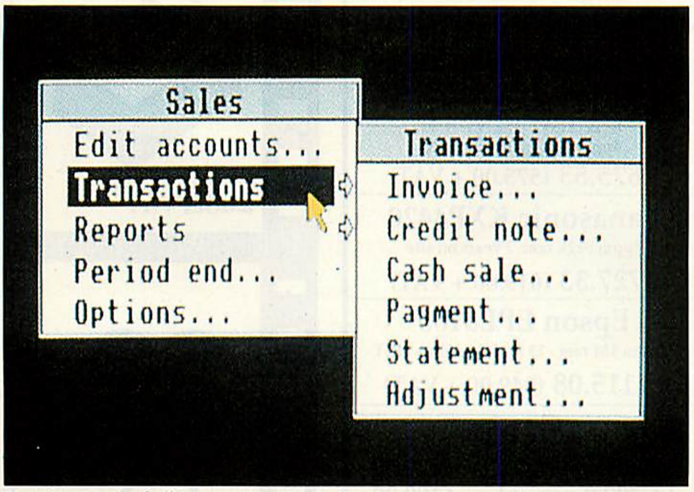
CHOOSING YOUR MODULES

The average home user will not need to keep individual accounts for debtors or creditors – or at least one would hope not! In this case, the accounts can be kept using just the Nominal Ledger. This will keep track of cash and banking details, analyse income into the sources and expenditure into whatever categories are preferred.

Depending on their products, cash retailers may not need the Sales Ledger or Stock Control module, whereas many other small to medium business users will be best off with the whole system.

analysis, a separate dummy invoice is made for each department or expense item.

Normally the supplier's own statement will be available, but the system must also produce internal statements in order to comply with the period end routine. As with the other period end routines, the details that are removed from disc will be available in the period end listings, (and on your back-up disc) for future reference. Remittance advice can be printed to accompany payments and VAT, and trade and settlement discounts are accounted for.



Keeping track of all transactions is the key to good accounting

STOCK CONTROL

Each item of stock can be identified by a reference name or number of up to eight characters. The stock record for each item contains the following: a 24-character description: a department code, a product-type code, a supplier's purchase ledger account number, re-order level, VAT code, the current cost price, the average cost price per item, the selling price, the quantity in stock and finally the turnover. There are many useful reports available, as shown in our screen shot of the stock menus derived from the control panel. The period end routine for stock control is, once again, performed monthly.

NOMINAL LEDGER

This ledger is at the heart of the system and holds the complete account records of the business. The accounts are divided into the usual four groups – income, expenditure, assets and liabilities, and each group has up to 100 separate accounts available. Some of these accounts are pre-defined (known as fixed accounts) and the user can add further accounts to meet their own requirements.

The original set-up of this ledger is the most important part of running the program and also the most difficult. We strongly recommend that an accountant is sought out at this initial stage as the results will, at a later stage, be falling into the hands of the dreaded Inland Revenue!

The all important bank accounts are dealt with in this ledger. All monies received (cheques or cash) are initially posted to the cash-in-hand account and then, when the banking takes place, this amount is transferred to the bank as a separate transaction.

One part of this module that is particularly suitable for retail businesses, is the cash-up facility. It allows for cash received, deductions for cash expenses and any banking of the balance to be recorded in a single process.

The VAT control account is also in this ledger and the routine takes place from the beginning of the current VAT quarter. Pres actually offers an assurance that the system has been examined by a Customs & Excise Inspector, who passed it as suitable for VAT accounting requirements and for Retail Schemes A and F.

Menu facilities for the inclusion of accruals and prepayments are provided at the beginning and end of each period. Depreciation can be calculated and entered on a monthly basis, and interim profit & loss accounts can be produced at any time, for example once a month, to show the progress of business. Departmental accounts can also be produced.

Once again, the period end routine must take place monthly. The audit trail is printed, followed by a list of all transactions, and finally all the previous month's transactions are deleted from the disc and the balances are brought forward. It is essential that these printed listings are carefully filed.

The final accounts, profit & loss account and balance sheet, are produced by choosing the Final icon on the control panel.

FEELING SECURE

After installation, the user's name is entered, which triggers a prompt for a security code. This can be obtained from suppliers over the telephone and the system manual will be sent to each registered user. A further final accounts code is also supplied to give restricted use to the final accounts section in the Nominal Ledger module.

The program will run without the security code but only for ten sessions before it freezes! This means, of course, that the system can only be used by one registered user. If the user has more than one business or is a professional accountant wishing to put more than one client on the system, he can apply to the suppliers for additional security codes which are available at £80 each.

This package was obviously designed by someone with experience at the sharp end of book-keeping and accounting for the small to medium business. Providing it is used according to the carefully laid-down instructions, it will do the task that it is designed for very efficiently.

The system manual is excellent – for instance, a data disc logging sheet outlines the routine for disc backup mentioned above. It is both comprehensive and easy to follow and is supplied in a strong ring binder. Also supplied is a green card which provides a useful quick guide to entry procedures for the more common transactions.

There are a couple of minor bugs, relating to the annual turnover report and the fact that the audit trail batch report displays the current batch number only. However, alternative solutions to this are offered in the note with the current version.

One bonus is that a product support scheme is available free for the first month to help you to find your feet. A free demo disc is on offer direct from Pres. The advice must be: if you are a potential business user, obtain a copy and discuss with your accountant whether it will fulfil all the requirements of your particular business – the system is constructed in such a way that it should be easily adaptable.

Like all accounting systems of this size, transactions need to be regularly deleted from the disc. This involves an end of period routine, when the discs are backed up and also a hard copy of transactions is filed. Any adjustments made by the user should be given adequate references in the eight-digit box provided, and explanatory notes then filed as part of the permanent accounting records.

THE PC COMPARISON

Comparing Micro Trader with available accounting programs of its size, and consequent limitations, most of which are only available for PCs, it comes most favourably out of the comparison both in terms of performance and price.

It is powerful, flexible and certainly a pleasure to use. There is the added benefit that the Arc's desktop windows are in a different league to the much-publicised Windows on PC systems!

PRODUCT DETAILS

Supplier: Pres Ltd
Address: PO Box 319, Lightwater, Surrey GU18 5PW
Tel: (0276) 72046
Prices: Complete system (sales, purchase, nominal ledgers and stock control) £279.00, modules £79.95 each, Mailer £49.95, Payroll price not yet fixed. All prices exclude VAT

WHAT'S IN A TITLE?

A new package for video users allows the Arc to make its own contribution to the small screen. Peter Clements investigates

One of the most practical applications that Clares has published to date has to be *Titler*. Although it is primarily aimed at the video enthusiast, who can use *Titler* to add text and graphics to standard videos, *Titler* can also be used on its own to produce impressive demonstrations complete with graphics and music. To use the software as a video tool, you must have a suitable genlock board fitted to your computer.

Titler comes supplied on two disks. The first disc, suitably named *Titler*, is used for creating screens that can contain both graphics and text. The second, called *Sequencer*, is used to link those screens and create a sequence of pictures and/or animations in just about any style that you like.

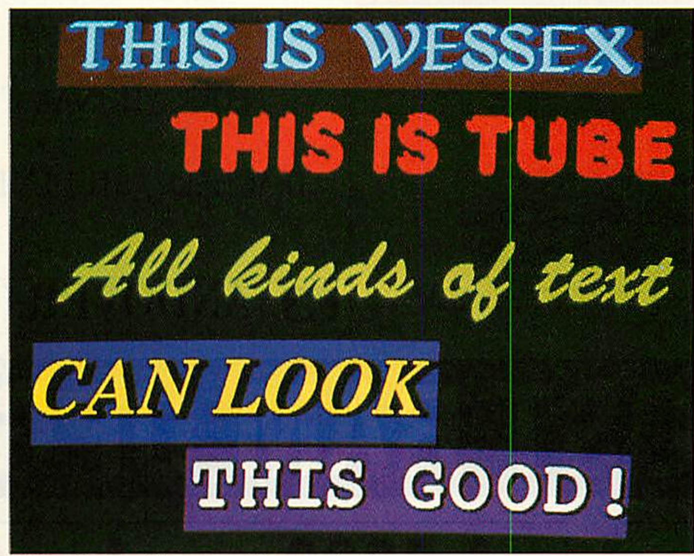
Upon loading the software, you are greeted by a small main menu containing six icons and a longer grey rectangle situated below. The icons denote File Information, Fonts, Text Formatting, Effects (FX), Colours and Tools.

THE SCRIPT

The grey rectangle acts as an entry box which, when clicked on, allows access to the Script editing screen. Entering text can begin immediately using the default font, size and colour. These options can be changed very easily, either by returning to the main menu or by making use of the keyboard shortcuts (a function keystrip is provided). The Script editing screen is initially black, but any of 11 other colours can be used instead.

Pictures created using art packages can also be used as backdrops for your text and can be imported from *Atelier*, *Pro Artisan*, *Render Bender* or as *Draw* files or sprite files. Finished work can be saved in these same formats or as a *Titler* script or format file.

Text is entered at the cursor position and can be moved around the screen until it is fixed by pressing the Select button. Blocks of text can be built up in this way and each block can be assigned a different font, colour or size before fixing. Kerning – reducing or increasing the space between letters – is a useful inclusion, and this really comes into its own when using large characters, as at this size the gaps appear wider than ever. *Titler* allows you to kern up and down as well, which is ideal if you want a rippled text effect.



Titler offers a wide range of fonts and effects

Titler uses outline fonts and these can be fully anti-aliased even at very large sizes. This is because the emphasis here is on visual presentation rather than providing a standard desktop application such as DTP. Text can be fully justified, positioned left, right or centred and coloured in any one of 12 colours, three of which are user-defined. The intensity of each of the colours can also be changed and a useful touch here is the ability to alias the main text colour – which might be red at full intensity – to the outline colour, which can either be a darker red or a different colour altogether. A range of special effects are provided with *Titler* and these include Drop Shadow, Underline, Rubout, Background and Slowprint. All of these can be active at once although you might not need them to be.

Drop shadows can make all the difference to a good looking block of text and can be offset and assigned any colour, again with the ability to increase or decrease the intensity. Underlines can also be coloured, the height changed or even the shape altered at the end of a line.

When in Rubout mode any text typed at the prompt appears on a chosen background colour or box, the height of which is not adjustable. This is useful if you want your text to really stand out over a video image.

Perhaps the most interesting option available from this menu is Slowprint. This feature allows blocks of text to be displayed one letter at a time. It is therefore possible to create an effect where the letters appear to be typing themselves on to the screen.

Add some other possibilities, such as the delay between each letter or line, or a Flash routine which, if used carefully, can create the effect of text fading up to full intensity, and it soon becomes apparent what a sophisticated piece of software *Titler* is.

SEQUENCING

This becomes even more obvious when you transport your work into the Sequencer. Pictures and animations can be dragged into the Sequencer window and displayed on the screen in a variety of ways.

Initially, the window is empty but loading a screen reveals three columns. The first shows the 'in' effect – the way that the picture is displayed when the sequence is run – the second, the filename, and the third, the 'out' effect. Clicking on the In or Out effects boxes cycles through those that are available to the user, some of which can be very impressive indeed. The program can accept *Render Bender* and *Euclid* animations, allowing the user to set both the speed and the number of times that they are displayed.

Music can be added in the form of *SoundTracker* tunes or *Armadeus* samples, so there really are a wealth of options to be explored. Sequences complete with music can be saved to disc either as files to be loaded back into the software or as stand-alone applications.

CONCLUSION

Up until now there has been very little in the way of video-dedicated software available. Clares seems to have changed that. This software is packed full of useful and helpful features and is certainly going to dominate this particular area of the market for some time.

PRODUCT DETAILS

Product: Titler
Supplier: Clares Micro Supplies
Address: 98 Middlewich Road, Northwich, Cheshire. CW9 7DA
Tel: (0606) 48511
Price: £127.62 plus VAT

THE YOUNG ONE

Junior Pinpoint is aimed at the primary school. But will it live up to the standards set by its older cousin? Chris Drage puts it to the test

As every teacher knows, data handling plays a leading role in the National Curriculum. Not only is it one of the five strands of IT, but data handling can also make a valuable contribution to many other subject areas, such as geography or history. As a result, it is very important for primary schools to choose the right data handling software and so the search for the definitive database continues.

Based on the popular *Pinpoint,* the new *Junior Pinpoint* hopes to lay claim to this title. The new version shares many features with its older cousin, but it has been simplified in certain areas in order to suit the needs of key stage 2 children. As well as being aimed directly at this age group, *Junior Pinpoint* can be configured to suit the age and abilities of a particular group of children, and additionally the editor and analysis tools can be deselected.

Like *Desktop Folio* by ESM, *Junior Pinpoint* allows you to design your own questionnaire forms to collate the data. Gone are the trials of setting up a template record card and in comes a simple form, limited to one page, with designated areas to enter answers. *Junior Pinpoint* offers whole screen or A4 sizes of stationary. Various types of answer are allowed for, such as plain text; a whole or decimal number; yes/no; dates and multiple choice.

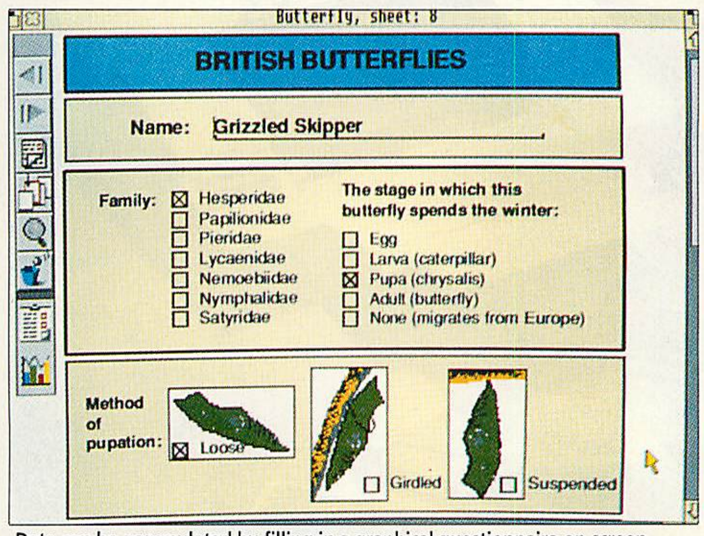
USING THE TOOLS

Several tools are used to layout the form. A pen allows the user to enter text in any outline font in any size and there is a tool to draw borders in differing thicknesses with a variety of corners. In the same way as *Draw*, objects or sprites can be added and positioned, altered and arranged.

To place questions on the page, a question tool is used and the type of answer is selected from a dialogue box. Question and answer boxes can be dragged and positioned at will. Once complete, the questionnaire can be filled in on screen. Alternatively, they can be printed out, as a traditional questionnaire and the data entered into the computer at a later date. Once the facts and figures are collated, they can be manipulated to your heart's content and all data analysis is performed from a spreadsheet view of the file. Fields can be selected, deselected, searched, sorted and so on. Statistics are limited to largest, smallest and average and graphs to frequency, percentage and culminations of these. Graph styles include pie, bar, line and scatter with optional 3D effects and grid lines.

By plotting one graph at A4, another can be plotted and placed beside it, still leaving space for a report. Although children will need some practice to get the best out of the analysis section, familiarity with Risc OS will help and some interesting presentations can be achieved.

There's no manual as such, just a guide book full of illustrated examples for children's use. Pages can be photocopied and worked through in sequence or individually, but children need to be reasonably fluent readers. The idea is excellent as it means that even reluctant teachers can enjoy the hands-on tutorial.



Data can be accumulated by filling in a graphical questionnaire on screen

WHY JUNIOR PINPOINT?

Although *Junior Pinpoint* is based on *Pinpoint* there are some significant differences between the two applications. The kind of statistical operations performed from the sheet view are limited and there is no analysis workbench, making it impossible to open more than one stack of data sheets at a time. Ordered choice questions cannot be created or read and standard deviation, mean and median are not available. It is also impossible to perform a sort within a sort.

However, the language and configure option of *Junior Pinpoint* make it better suited to young children. *Junior Pinpoint* is limited to 500 sets of responses per questionnaire whereas *Pinpoint* can handle much larger files, multiple sheet questionnaires and has no size restriction of A4 or whole screen.

Junior Pinpoint is aimed at primary children, demanding a level of understanding relevant to years 2-6. *Pinpoint,* however, addresses data handling requirements of the National Curriculum for mathematics, key stages 3-4. We reviewed *Pinpoint* in our December 91 issue.

SUMMARY

Setting up the questionnaire, entering questions and their data type and data entry is very easy indeed. Analysis and presentation is more complex but as everything can be de-configured and only introduced when children are ready, few problems are likely to arise.

Although a number of systems are already available for the Archimedes – *Datasweet, Junior Database* and *Keynote* are all well known – none of these apply to as many strands of IT capability as *Junior Pinpoint.*

The result is a software tool well-suited to primary school use and one of the few data handling programs that is truly fun and rewarding to use. At £24.00 it's money well spent.

PRODUCT DETAILS

Product: Junior Pinpoint
Supplier: Longman Logotron
Tel: (0223) 425558
Price: £24.00 for the stand alone application, £72.00 for a site licence

HOMEWARD BOUND

Chris Drage looks at a range of educational programs for young children to use at home

Parents often agonise over their childrens' grasp of the three basic Rs, and the latest software from Triple R Education aims to put this to rights. The range covers the fundamental educational topics of spelling, arithmetic and currency manipulation and this software is firmly aimed at the home user.

There are four separate applications within this range: *Picture Book, Money Matters* and *Target Maths* are suites of CAL (computer-assisted learning) programs, whereas *Converta-Key* helps younger children to use the keyboard. Although we reviewed the Archimedes' version, the BBC B and Master 128 versions are very similar.

PICTURE BOOK

Picture Book consists of four programs aimed at helping young children to become familiar with computers. As children are taught lower case letters before upper case, they often find the Qwerty arrangement confusing.

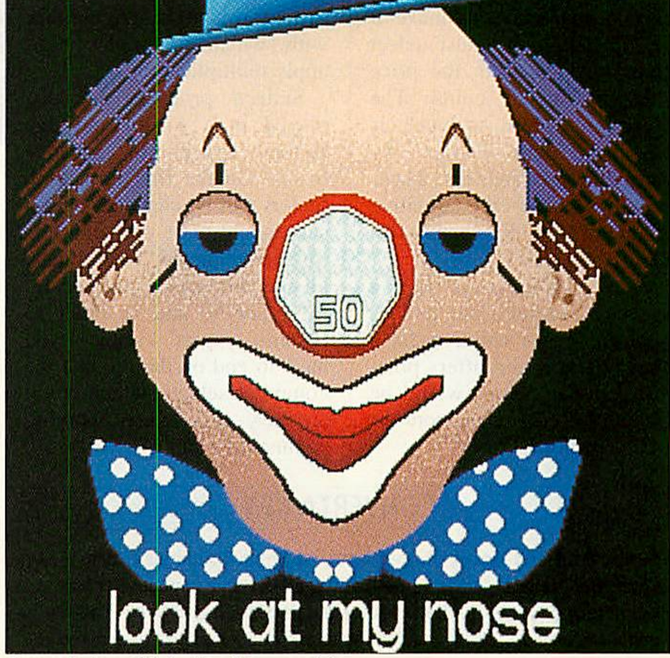
Triple R Education has helped to overcome this handicap by including two plastic strips in the package, which can be applied to the computer keyboard to depict the lower case letters in either an alphabetical or Qwerty arrangement. An opening menu offers a choice of four programs: *Alphabet Book, Snap, Spell It* and *Count 'Em.*

FIRST THINGS FIRST

Alphabet Book is a computerised alphabet where letters are represented by objects. To capture the childrens' interest, simple animation is used; as a letter is pressed, the picture appears with its name and an accompanying sound. Of course, young children love the sounds, but some are repetitive, and there is a limit to the enjoyment a single banjo chord can provide.

I would prefer to see the use of a digitised voice reciting the word, so as to reinforce the links between sound, writing and pictures. After all, as teachers we are always trying to emphasise that reading is just speech written down.

The same pictures and sounds are then used in *Snap*, a matching game for up to three players. The pictures appear on the screen and to score a match the player presses the space bar. The first player to gain three points is the winner.



Cozmo helps with basic coin recognition . . .

Although the repetition of the sounds is guaranteed to send parents potty, children actually love it. Remember though, competitive matching games are hard on the computer's keyboard as youngsters try to be the first to hit a key.

The final two programs also use the familiar pictures: *Count 'Em* is a counting exercise with three levels of difficulty. A random number of pictures appear on the screen up to a chosen limit of three, six or nine, and the child must enter the correct number from the numeric keys. *Spell It* requires the child to spell out the letters to match the caption for the picture on the screen – the overlay here is very useful. There are two levels, the second of which has no caption to help with spelling.

A pleasing aspect of *Picture Book* is the way that on-screen letters closely match those on the overlay strip, helping to reinforce letter-shape recognition. My four year old loved all the programs, especially the digitised applause for getting things right.

MONEY MATTERS

Learning about currency can be fun and this is obviously the aim of *Money Matters*. Based on a clown's theme, this application, like *Picture Book*, consists of four programs and uses a plastic keyboard overlay. However, this time the pictures on the strip are of coins and other symbols.

In *Cozmo's Coins*, Cozmo the clown helps children to recognise coins and discover their values. It's a program with three levels in which the third is timed. The next clown in the line-up is *Boingy*, named after his sprung nose. He chooses a few coins which add



. . . Boingy is the expert at working out the tips in restaurants . . .

up in value to one particular coin and the children must select the correct coin from the set displayed.

Children can earn money in *Fizzy Pop*, by helping Fizzy the clown to add amounts and give the right change. To add variety, the highest value and the number of coins in the change can be pre-selected.

Piggy Bank is a similar program, in which Toothy the clown thinks of a price and states the number of coins he expects to receive to make it up. The children must select coins to equal both the price and number of coins. The object is to earn as much as possible from Toothy by getting correct answers. These activities have the positive feature of providing help when things go wrong.

Money Matters is not a teaching program, but it does reinforce what children have already learnt and offers practice activities which would be of help in the classroom as well as at home.

TARGET MATHS

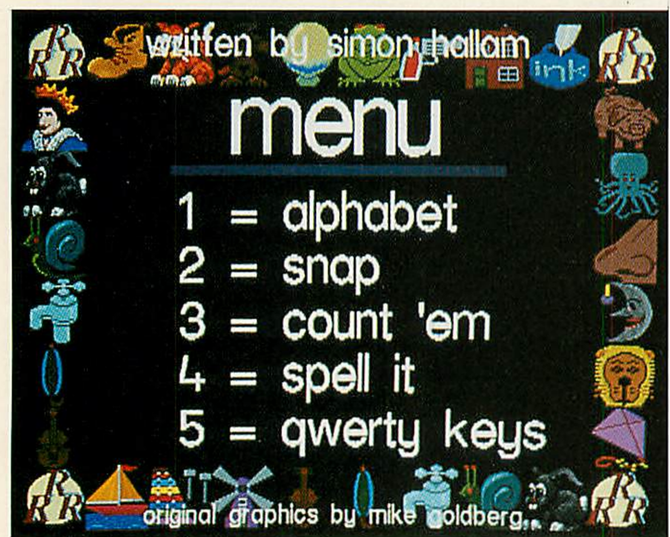
Target Maths is another set of four programs. Designed with eight to 11 year-olds in mind, it is intended to make the exploration of maths enjoyable, relating it to the National Curriculum requirements at key stage two.

The handbook describes *Eliminator* as a fun game which will take the chore out of learning tables, when in fact it does nothing of the sort. Instead it is a challenging task with which to practise and apply multiplication.

Sixteen products are displayed in a square and two factors appear in separate boxes. On the first turn, both factors can be changed, but on subsequent turns only one factor can be altered. To eliminate all the products requires careful planning and in order to obtain 'expert' status, you have to end on the product the computer selects, which is not an easy task when working against the clock.

CONVERTA KEY

Picture Book and Money Matters both use Triple R's unique plastic keyboard overlays, Converta-Key, designed to make keyboard entry simpler for younger children. It is loaded prior to the software.You are given a choice of a Qwerty arrangement or an alphabetically ordered key strip. The plastic key strips are fastened to the keyboard with the sticky-back velcro supplied. Converta-Key comes with eight sample programs which are of little real value. As most Arc programs for younger children use the mouse to pick letters from the screen, Converta-Key may be of limited value. However, you may want to try using Converta-Key with programs for the BBC B and Master 128, which exclusively use keyboard entry. Although this system works adequately in the home, it can never replace a school's overlay keyboard for convenience, reliability and robustness. Converter-Key costs £8.47 but the stand-alone package is due to be discontinued and there are limited supplies only.



FIve of the best for the three Rs

. . . and Toothy teaches the virtues of honesty – no short-changing here

Number Facts is based on a knowledge of the properties of prime, square and triangular numbers. The first part allows children to explore numbers and their properties on a hundreds square.

Once confident, they can tackle the second part of the program where, in pairs, they must select numbers that have a chosen property. This is a challenging game which every year five or six classroom should have available.

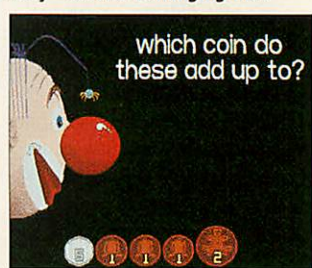
Scale Factor is another program I would be happy to use in my classroom. The four levels give children practice in reading scales using single place decimal numbers.

At the higher levels, addition or subtraction must be performed first, before fitting the result on a scale. What I particularly like about this program is the challenge of finding the right scale for the target number.

Slider is one of the most difficult tasks on the disc. It is similar to snakes-and-ladders but on a hundred square, with no clues as to which numbers represent ladders or snakes.

The task is to discover which of the numbers take you up and which take you down to reach 99 in the lowest number of moves. It sounds complicated at first, but after two games the overall pattern begins to emerge.

Target Maths is a worthy set of programs. I recommend it to both schools and home users, as an extension of number work that the child has learnt at school.



Boingy keeps on asking

SUMMARY

Most teachers welcome the practice of home-based activities that reinforce what the child is learning at school. But, if a program deals with unfamiliar concepts, it can result in frustration for your child, so it is a good idea to check what you are doing with your child's teacher.

My only real criticism is of *Picture Book*, not just because the banjo chord used as a sound effect grates on the nerves, but because the opportunities provided by the Arc for sound output are too great not to employ 'talking' books as well as sound effects and pictures. But, overall, the programs make up a well thought-out range suited to many ages and abilities.

PRODUCT DETAILS

Products: Converta-Key, Money Matters, Picture Book, Target Maths
Supplier: Triple R Education, 1 Percy Street, Sheffield S3 8AU
Tel: (0742) 700661
Price: £16.97 plus VAT, £8.47 for Converta Key
Machines: BBC B, Master 128,

CADet

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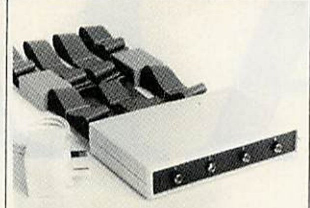
- ☆ *Runs on any Risc OS system in 80K.*
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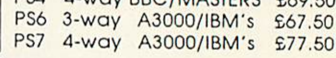
Demo version £5.00 - deducted from subsequent purchase price.
Single user £39.00.
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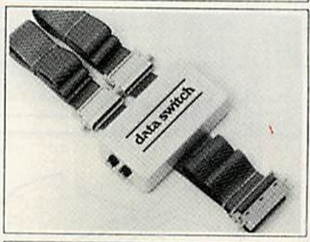
PRINTER SWITCH-BOXES



Ideal for schools and colleges. All versions come complete with cables, the 4-way units are fitted with 2x3.7m+2x1.7m+0.6m to the printer. Data buffers are fitted to the extra long 3.7m cables.

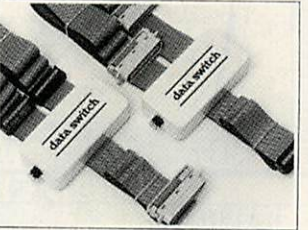


PS3	3-way BBC/MASTERS	£59.50
PS4	4-way BBC/MASTERS	£69.50
PS6	3-way A3000/IBM's	£67.50
PS7	4-way A3000/IBM's	£77.50



The compact PS5 switch box is designed for the A3000 and IBM PC compatibles. The PSab version will allow 1 BBC+1 A3000 to share one printer. The ribbon cable lengths are 2x1.7m+1x0.4m to the printer. Super Value!

PS5	2-way A3000/IBM's	£34.50
PSab	2-way A3000+BBC	£34.50



These reliable switch boxes have a proven record of over 6 years daily use in many schools and colleges and are highly recommended. The ribbon cables fitted are 2x1.7m+1x0.4m with appropiate connectors.

PS1	2-way BBC/MASTERS	£31.50
PS2	1 BBC to 2 PRINTERS	£31.50

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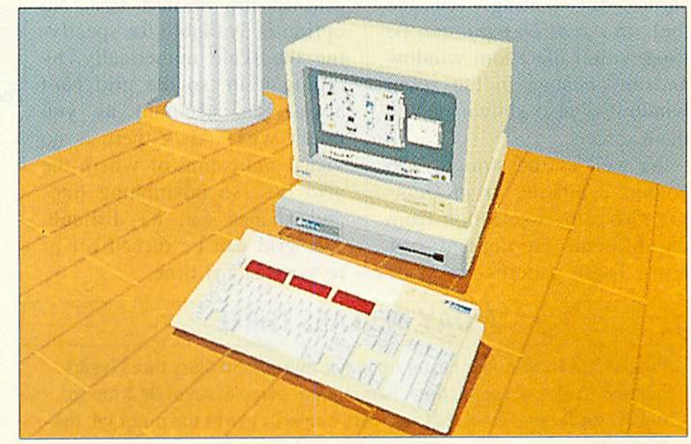
MODERN ART

Arcol has at last been brought up to date with a new desktop compatible version. Rob Miller takes a closer look

The original *Arcol* was one of the first art packages for the Archimedes computer and was based entirely in Mode 13, making no use of the Risc OS Wimp interface. Instead, it used its own system of pull-down menus, similar to those found on the Apple Macintosh.

But, at the time, *Arcol* was rather an impressive program, boasting fast sprite handling and comprehensive flood-fill options. It also allowed double screens in the form of two Mode 13 screens, one on top of the other – particularly useful for producing poster-size pictures, which could be printed out using Arcol's own built-in printer driver. A number of other features, such as support for graphic tablets and a collection of painting effects like blend, wash and recolour, made Arcol one of the best art programs available. However, these days desktop compatibility is an essential part of any application, and so ExpLAN have now released a new version, known aptly enough as *Arcol Desktop*.

Clicking on the *Arcol Desktop* icon takes you directly into a Mode 13 screen with a menu selection bar along the top. A 256 colour palette is also displayed, plus a brush selection menu and an Undo button. The position of the menu-bar and palette is fixed; not much use if you want to select different colours and work in the top area of the screen. The menu-bar/palette can be toggled on and off, but this means that choosing a new colour involves switching the palette on, selecting the colour, and then switching it back off. However, hot key short cuts are provided for most tools and this goes some way towards rectifying this problem.



One final problem with the menu bar, is inherent from the first release of *Arcol*. Any graphics that are drawn or deleted while the menu bar is on are unaffected. This means, for example, that clearing a screen with the menu bar on, leaves a strip along the top of the screen where the menu bar was. Not particularly drastic, but nonetheless an irritation that ExpLAN have promised to look into.

TOOLS OF THE TRADE

Arcol Desktop is divided into six groups. Tools, Edit, Screen, Effects, Sprites and Text. All six have sub-menus from which individual tools or options can be selected.

Tools contains all the graphic primitives; lines, curves, triangles and ellipses and so on. Single points can be plotted and a sketch option allows for freehand drawing. A Spray Can tool works well, especially in high resolution modes where the pixels produce a realistic blurred effect.

A comprehensive set of fill options allow objects to be shaded in a number of ways. Horizontal, vertical and circular graded fills are all possible, plus an in-between option that changes the shape of the fill depending on the shape of the object being shaded.

Graded fills can contain up to 16 different colours which are defined by altering a special fill palette. Any colours out of the 256 available can be used, although colours that 'fit together' work best. Unlike some other art packages, there is no option to define a fill palette by selecting a start and end colour.

There are however, a number of pre-defined palette fills that are supplied with *Arcol Desktop*. These include all the primary colours from black up to full saturation, plus full saturation up to white and they can be loaded, in place of the default settings, via the main palette menu.

The level of dithering, using alternate coloured pixels to produce a 'third' colour between the colours in a fill can be altered from zero, which specifies no dithering at all, up to nine, giving extreme dithering.

IN ACTION

It is a good idea to start of with a 'wire-frame' sketch of where the various objects will be. A straight line tool is essential for this and comes in useful for creating lines of perspective. Black lines on a white background are easier to view and *Arcol Desktop* allows you to set the background and foreground colours to any one of 256 available.

Lines can be created by marking one point, and then dragging the other point to the desired position. Although the zoom window can be used for accurate positioning, it does tend to 'hop' about if you are drawing lines from one side of the screen to the other, or working in the middle. After completing the sketch, unwanted lines can be removed using either a white brush, or rubout. Rubout is very useful and allows any current tool to use the background colour (as opposed to the foreground colour) by using the Adjust button instead of the Select button. The next step is to fill all the blank areas with the desired colours. All colours can be selected from the colour bar, or by 'picking' them off screen. A special 'hot-key' allows 'pick' to be selected without going through a menu. One feature not found in any other art package is Re-shape sprite; used to create the picture on the monitor. The sprite was 'grabbed' directly from the desktop using *Arcol Desktop*'s Grab Screen Area tool.

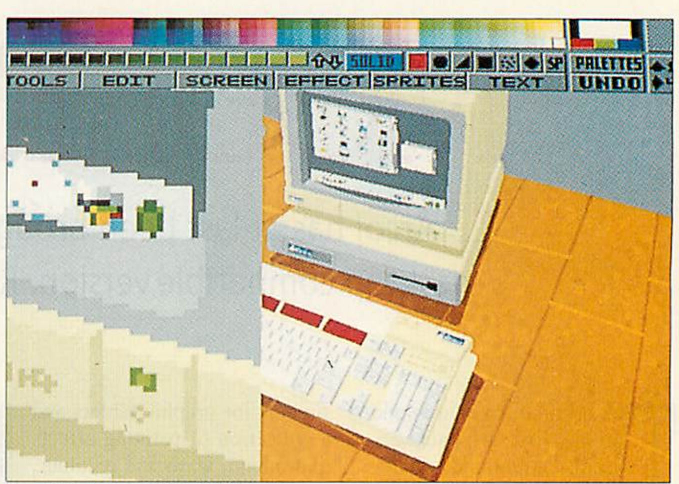
Finally, detail such as shadow was added to give depth. *Arcol Desktop* has a number of effects to allow blending of colour on screen. Pre-cut out sprites can be used as brush shapes, making the creation of drop shadows simple, such as the pillar on the left of the picture.

IN CLOSE UP

One of the most vital parts of any art package is the zoom tool. In *Arcol Desktop*, a fixed 'window' is used to display an enlarged area of the screen. Any part can be enlarged by positioning a small rectangle (scaled to show the resolution of the zoom) over the desired area. The zoom window can then be scrolled up, down, left or right, and enlarged or shrunk for editing. All the tools in *Arcol Desktop* can be used within the zoom window and any change in the zoom window is also shown on the main screen.

As well as the straight 256 colours available, *Arcol Desktop* also allows selection from 28 different pre-defined patterns. These patterns are made up of 4 x 8 blocks which can be altered using a built-in editor. New patterns can be saved or loaded from disc to supplement the default selection. When a pattern is selected, it is used as the 'colour' for all successive operations so that you can define your own patterns.

The remainder of the edit options effect the whole screen. The pointer movement can be locked to a definable scale and is set by stretching a grid to the desired size. No option is available for specifying the scale numerically, by typing it in, so the grid isn't always as accurate as you might wish. Also, there is no visual indication of where the grid lies, so positioning lines and shapes can be difficult. The grid can be turned off or re-sized at any time.



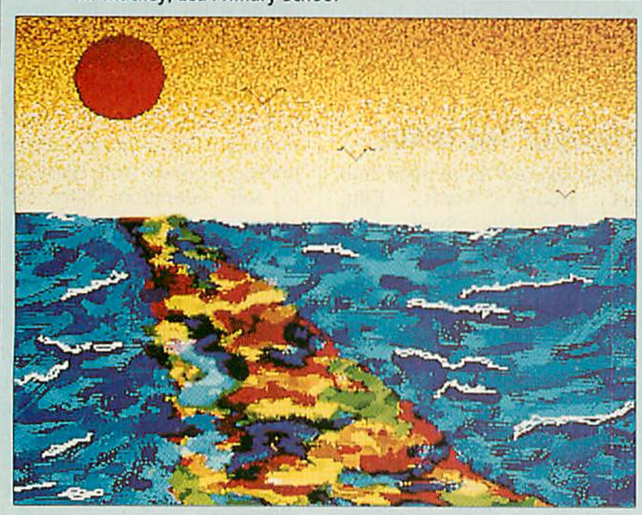
Zooming in on a pictorial detail

A DAY IN CLASS THREE

One day, just before our Easter holidays, myself and Class three (years four and five) spent some time 'hammering' away at *Arcol Desktop* to check it for faults. Given that we were beginners with the program, the children's efforts were largely experimental, using the numerous possible effects. Although we did not produce a vast number of completed pictures in this short space of time, we did manage to get some examples and also jot down some thoughts about the program. We particularly liked the single main menu at the top of the page. It is frugal with space and its easy to operate. Most options were easy to use: we found the Zoom and Undo options particularly useful and one 'short cut' options that we liked was Pickcolour. Also Cycle, Shade fill, Wash and Blend proved very popular and the palettes can supply a good choice of colour. We preferred to have the words printed in the options rather than symbols and changing the menu title from Mode to Effect has made its purpose clearer. Overall, *Arcol Desktop* is much preferred to the original program as we can now run more than one program at a time.

Mr Mackey, Lea Primary School





A picture can be cleared at any time to the currently selected background colour. oddly enough for such a drastic action, no check is made before the picture is deleted although you can resort to the Undo option which allows you to backstep the last action.

Undo can be selected from three different places; the main menu, the Edit sub-menu and through the hot key U, and this is one point where the menu bar problem becomes apparent. Selecting Undo via the menu bar only undoes the part of the screen not obscured by the menu bar, leaving an unwanted strip across the top of the screen.

SPECIAL EFFECTS

The list of painting effects is perhaps *Arcol Desktop's* strongest feature. Different effects can be selected (one at a time) to alter the way in which colours are painted on to the screen.

Apart from Solid, all the options produce a colour depending on what is already on screen. For example, Invert changes the colour of all pixels to their opposite; rather like looking at a colour photograph negative. Wash and Blend both have the effect of mixing the currently selected colour with that on screen.

Recolour, Cycle, Anneal and B&W all swap the current colour for another. Recolour requires two 'fill palettes' to be selected and swaps any colour from the first to its equivalent in the second. Cycle uses a 'fill palette' as a look-up table and changes any one colour to the next in the list. Anneal has a similar effect but uses the full 256 colour palette as the table. B&W changes all colours to their grey-scale equivalent.

SPRITES AND TEXT

Sprites can be altered in a number of ways, the most impressive of which are Stretch and Rotate/Scale. A sprite can be reshaped to fit into any four-sided shape or squashed into a ball. All sprite manipulation is carried out in real-time; for instance a sprite will actually rotate as you move the mouse, and is most impressive, especially on Arm3 based machines.

The text option provides a number of fonts which you can use for captioning and labelling. No use is made of Risc OS outline fonts, although it is possible to use *Arcol Desktop's* snapshot facility to 'grab' words as sprites, from a *Draw* window on the desktop.

The supplied fonts are all bitmaps (made up of a grid of pixels) and so they cannot be scaled in size, without losing quality. They do, however, provide a quick method of adding text to a picture. Twelve text styles are supplied with *Arcol Desktop* and new ones can be created with the built-in font editor.

SCHOOL WORK

Arcol Desktop is aimed mainly at schools and so a selection of worksheets have been designed to illustrate various ideas relating to the program. They cover topics such as colour separation, shading effects and general design.

Nine worksheets are available and all can be copied for use in the classroom. All the

worksheets are clear and informative with examples where appropriate. Perhaps the only minus point is that they are in black and white.

A disc is supplied with the worksheets which includes files relating to the topics discussed. The worksheet kit costs extra (see product detail box) but is included free with an *Arcol Desktop* site licence

THE COMPETITION

Of course, few applications are released into a vacuum and in order to succeed, *Arcol Desktop* will have to compete against other graphics applications, such as *Atelier* and *Revelation 2*.

Atelier is the oldest program of the three and certainly shows it, with its pre-Risc OS front end. It is also limited to Mode 15 (640 x 256) graphics so that any pictures produced with it look relatively chunky.

Like *Arcol Desktop*, it runs from the desktop but uses a separate screen when the program is actually running. A single pop-up menu gives access to a number of submenus that contain the various tools to produce the artwork.

Accurate line drawing is simplified by the cross-hair window which is permanently on. This gives a magnified view of the part of the screen that the pointer is currently over. Simple pixel editing can also be done without having to have a special zoom window. Perspective lines are simple to create using the ray tool. This allows lines to be drawn from the same start point, for example, a vanishing point.

Atelier contains virtually every fill imaginable, apart from the multi-directional fill found in *Revelation 2*. Graded fills can contain up to sixteen shades and new selections can be created by specifying the start and end colours, as in *Revelation 2*.

Shadowing and highlighting are possible with the blend option. No facility is available to use cut-outs as brush shapes, so all shadowing/lighting must be drawn by hand.

Revelation 2 is by far the fastest art package on the Archimedes, even though it runs entirely on the Risc OS desktop. This means that all the tools have a more responsive feel. Lines can be dragged around the screen without any delay between the mouse pointer and the end of the line. Line drawings are therefore particularly easy to create.

The zoom tool in *Revelation 2* just consists of a new window in which a magnified version of the current picture is displayed. Any number of zoom windows can be created and any magnification can be set from 1/4 to eight times that of the original.

By using a zoom window, accurate line drawing is easy, even across the full width of the picture. If you have a large magnification set, the window automatically scrolls if the pointer is dragged outside the visible area. Movement around a zoom window is also made easier with the 'hand' (or pan) tool. This allows a window to be scrolled around in any direction.

Revelation 2 is the only art package (at present) to have 'any-direction' graded fills. To create a greyscale running from the bottom left to the top right of an area, just select the start point and end point, and it will fill between the two. Up to sixteen colours can be used for graduated fills. *Revelation* will 'calculate' any selection given the start and end colours. Creating shadows in *Revelation 2* is possible by washing (blending) black with an existing colour. No facility exists to use cut-outs as brush shapes, so all shadows must be drawn in by hand. An overall 'softening' of a picture can achieve a more realistic picture by removing all the jaggedness of lines. The 'blur' tool was used across the whole scene simply by dragging a box over the entire area.

WHAT'S NEW?

Unlike the original program, *Arcol Desktop* allows you to edit pictures in any 256 colour mode. A new mode is selected from the Risc OS desktop and used in any further editing. Any existing pictures or sprites are automatically converted into the new mode.

Sprites can now be imported from any other 256 colour mode. Currently available sprites are shown in a window on the Risc OS desktop in a similar way to *Paint*. New sprites can be added to the pool by just dropping them onto this window. Selection is also done via the desktop by clicking on the desired sprite.

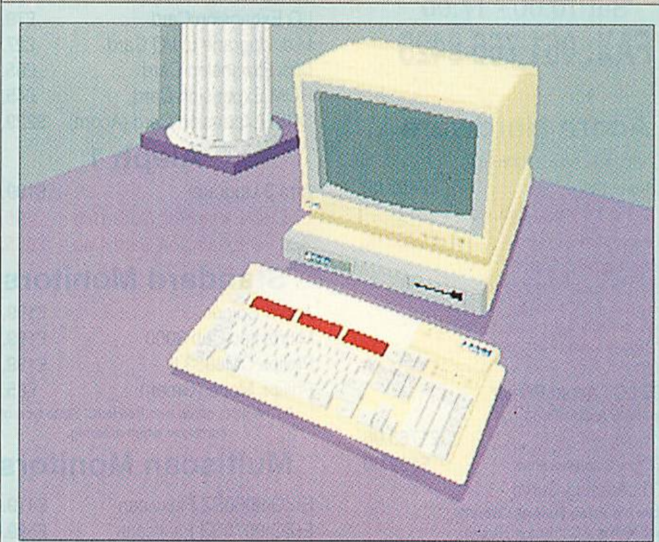
All sprite and screen, saving and loading is now carried out from the desktop. Printing is now possible from the desktop via the standard Risc OS printer drivers and a special option allows posters to be printed on multiple sheets.

CONCLUSION

In the light of recent art packages, *Arcol Desktop* looks rather dated. The attempt at incorporating what effectively is a stand-alone program into the desktop environment, only partially works. The need to switch to and from the desktop, each time you wish to load or select a new sprite, is very awkward. And because the bulk of the program is not Risc OS-like, it can be confusing to the untrained user.

However, in terms of value, *Arcol Desktop* is very good good buy: £50 is not a high price to pay for so many features. But if ExpLAN want *Arcol Desktop* to be a serious contender to *Revelation 2*, a third release would have to be fully desktop compatible.

THE COMPETITION





Atelier (top picture) allows easy colour with every fill imaginable, and Revelation 2 (lower picture) is the fastest art package for the Archimedes

PRODUCT DETAILS

Product: Arcol Desktop
Supplier: ExpLAN UK Limited, 20 Plymouth Road, Tavistock, Devon, PL19 8AY
Tel: (0822) 613868
Price: £50; site licence (inc school worksheets) £250; separate worksheets £12; upgrade £6.50.
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GAME SHOW

British olympic stars, such as Fatima Whitbread and Linford Christie, are lending their personas to a new game being produced by Krisalis Software with help from Acorn. Provisionally entitled *Quest for Gold*, the five-event game will be the only athletics simulation available for Risc OS machines apart from the rather disappointing *The Olympics*, released by The Fourth Dimension three years ago. It will fill an otherwise obvious gap when Olympic-mania hits planet earth in July.

The game, to be released on all formats in June, will be structured in a similar way to other Krisalis' sports games, comprising two parts: a management section, in which the athletes are trained and an arcade section, where they actually compete.

In training, the athletes' progress can be analysed with the help of graphs and charts. Digitised video footage of Fatima et al can offer advice and clues whenever a dilemma is reached, though as a respected trainer your word is definitely final!

The arcade part is split into five events: hurdles, 100 metres, high jump, long jump and javelin throwing. Players are represented on screen as large digitised images of real athletes rather than the drawn sprites that most games use. According to the producers, this makes motion very realistic and it looks 'superb'. The game will accommodate up to four human players and in multi-participant events, such as the 100 metre sprint, each successive player will see a replay image of the previous effort running along side. This provides something to compete against, given that it is not possible to squeeze four people comfortably onto one keyboard to race together.

The endorsement of six famous athletes in *Quest for Gold* (an exclusive feature of the Acorn version) will undoubtedly be a great boon for the game. And if, for some reason, you aren't their greatest fan you will appreciate one aspect of the management section, where you may cunningly over-train the competitors to the extent that they keel over with exhaustion and die!

Bad news from The Fourth Dimension: *Spitfire Fury* and *The Exotic Adventures of Sylvia Lain* have been cancelled due to 'author problems' before completion, despite advertising since well before Christmas. Production director, Mark Botterill said, 'We have never specified a price for *Spitfire Fury* so no-one sent us any money and all cheques for *Sylvia Lain* will be returned uncashed. *Hopefully* was printed by the expected release dates on our ads and we have never claimed they were ready to buy.' Expressing regret at the losses he added: 'It is possible that *Spitfire Fury* will be finished off next year but I don't advise anybody to hold their breath.'

Sam Greenhill

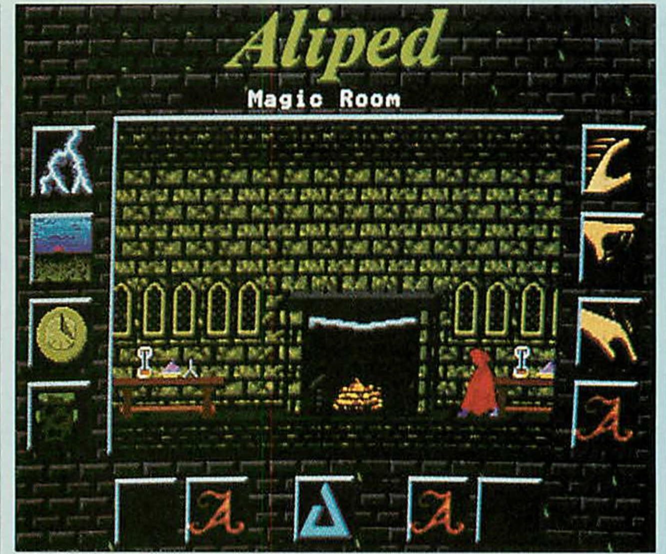
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All Risc OS machines
£14.95 plus VAT

Apparently you wish to marry Natasha. Apparently her evil step mother has put a nasty spell on you. Apparently you are imprisoned in a deserted castle. Apparently you have five days to find a counter spell or die in the attempt. Unfortunately I've played more interesting magazine type-in games.

You wander around a castle, which seems to be mainly stairs, trying to find the bits and pieces needed for your spell. I played through the entire game with the help of a written solution but, try as I might, I could see no clues, no matter how subtle, as to what I was actually meant to be doing.

To break the tedium of the endless stairs and corridors there is an occasional log fire but its crackling can be heard almost continually which is very irritating as there is no sound on/off control. The sound is actually stereo with the crackling moving between the speakers as you walk past the fires. Unfortunately I found one fire where the sound got stuck on the right channel and from then on all sounds came entirely from the right!



Aliped: A game that seems to be stuck in the eighties

The game is side view and for some reason north is up, as opposed to forwards. Controlling your wing-footed character, via keys or the mouse, is unbelievably difficult as movement is based on the absolute position of the mouse pointer on the screen rather than in relation to your figure. Picking up objects as you walk by them also involves many frantic mouse clicks, with more than one button.

There are two sorts of doors: side on ones that creak very loudly and don't give you your key back, and head on ones which don't eat your key but need a combination of mouse clicks to open. At least one door I found was wide open one way and locked the other, so you can actually get trapped behind it! Mouse clicking only works when the pointer is inactive in the central area of the screen but, as your character can move around the whole screen, it makes doing anything a very tricky proposition indeed.

There are no baddies to avoid or shoot and very few logic puzzles, just an awful lot of stairs. The only real puzzle I encountered, by following the instructions, could be avoided by doing things in a different order.

This game has a 1988-ish feel to it, which is not surprising really, as Dabs Press has been promising *Aliped* since the release of *Alerion*. The back of the box claims 'stunning use of stereo sound' and 'graphic defocusing found only in the highest quality animation sequences to enhance depth perception'.

I'm just a tad disappointed that this means a handful of crackling fires and a couple of blurred background sprites. Caveat emptor – don't waste your money.

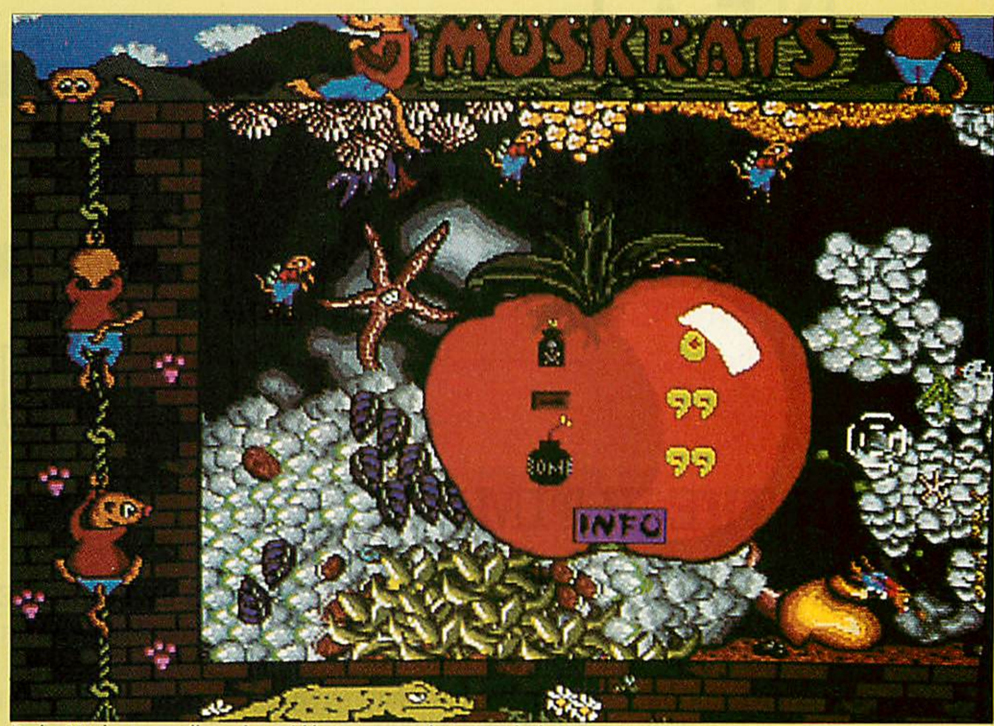
Danny Lanfranc

PESKY MUSKRATS

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According to the encyclopedia, a muskrat is a North American rodent that secretes a nasty pong from glands in its groin. This is presumably why the object is to prevent a muskrat population explosion. But it's not easy because a pair of muskrats are eminently capable of putting an entire warren of rabbits to shame, given half the chance. They need only pass one another casually and before you can say, 'Oh dear, it probably wasn't wise to let *that* happen,' a dozen or so baby muskrats suddenly pop up wearing nappies!

Pesky Muskrats is best described as the opposite of *Lemmings*. The aim is not to save the critters but to eradicate them as quickly as possible, by poisoning them or activating traps. There are some similarities: like lemmings, your average muskrat is about as intelligent as an educationally sub-normal carrot and it will generally plod along until it meets an obstruction. The game is entirely mouse controlled. Each of the buttons has a different effect, enabling you to select bricks, bombs or poison from a menu and position them using Select. It's true that 'muskrats get everywhere' for they must be dealt with underwater, in space and among rocks and dinosaurs in prehistoric times. This three-phase theme is repeated throughout the 63 levels.



Pesky Muskrats: smelly and stupid but very good at reproducing

The traps are activated when you click on them and annihilate any nearby rat in a variety of humorous ways: it could be sat on by a dinosaur, grabbed by an octopus or even vaporised by a laser gun.

Graphically, *Pesky Muskrats* is very good, even though only half the screen is used as the playing area. It's great fun to play but more than three sets of scenery would have been nice. The amount of disc swapping and waiting in between games annoyed me intensely. After three tries at a level you must swap discs twice and wait for over a minute. I calculated that I swapped discs nearly 250 times for this review!

There are certainly areas where *Pesky Muskrats* lets itself down but overall there is just enough challenge and playability to make a worthwhile game.

Sam Greenhill

GRIEVOUS BODILY 'ARM

The Fourth Dimension.
Tel: (0742) 700661
All Risc OS machines
£21.23 plus VAT

As groans provoked by the shamelessly punning title subsided, I found this was really rather fun, in a mindlessly violent sort of a way. Your character has the attitude problem of Mr T with the fighting ability of Bruce Lee and he's a man with a mission – to beat everyone senseless. You do this while strolling through a wide variety of scenarios, ranging from an office block to an industrial complex, picking up weapons as you go.

It's not all that easy though, as you have to deal with assorted burly thugs who look intent on scooping out your head and using it as a fishbowl. I encountered 'lady whiplash', who possesses a fully functional whip and a breed of psychotic cat which will fly at you, claws and teeth bared. The RSPCA might not like that bit very much.

Your muscle-man is also credited with some intelligence and must work out how to get out of various tricky situations. The game constantly catches you off guard though; just as you're grappling with a logical puzzle, which depends on split second timing and precision of movement, a large rotating saw will whizz between your ankles.

This game really does have the frenetic atmosphere of an arcade 'Beat'em up'. This is achieved by using 16 colour graphics and an almost constant animation rate of 50 frames per second, even with several adversaries on screen simultaneously. The advantage



Grievous Bodily 'Arm indulging in some mindless violence

of using fewer colours, combined with areas of unblemished wall space is that they have been enormously compressed onto the two discs, providing an astonishingly large area to explore. The cartoon-like backdrops are detailed and humorous too, giving the best of both worlds. As well as all this, there is a large sampled repertoire of crystal-clear grunts, crashes and plaintive miaows, which all add to the violent ambience – truly a game to play through a stereo!

Mat Tizard

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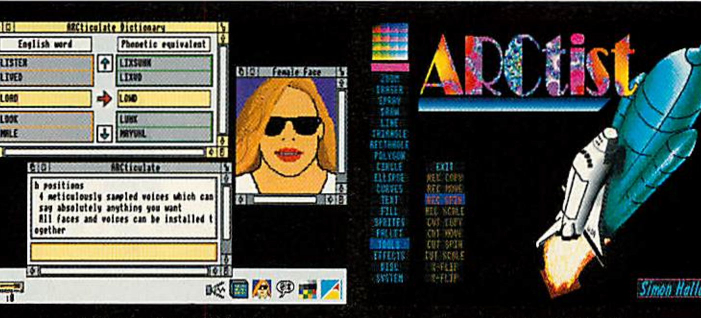
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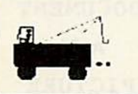
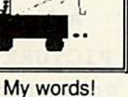


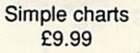
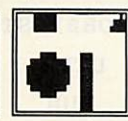
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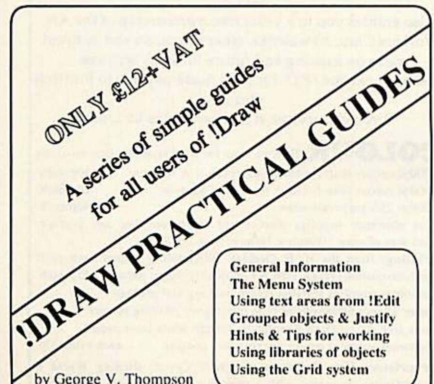
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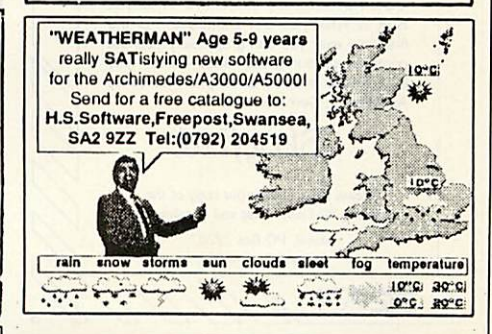
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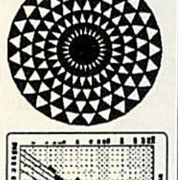
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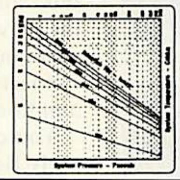
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ACORN USER ADVERTISEMENT PAGES – JUNE 1992

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I have just picked up a Macintosh Powerbook brochure from my friendly Mac dealer in Exeter. I sighed, almost cried, 'that's just what I need at the moment in time'. A professional handy and useful notebook computer that I can take with me to work and take home again.

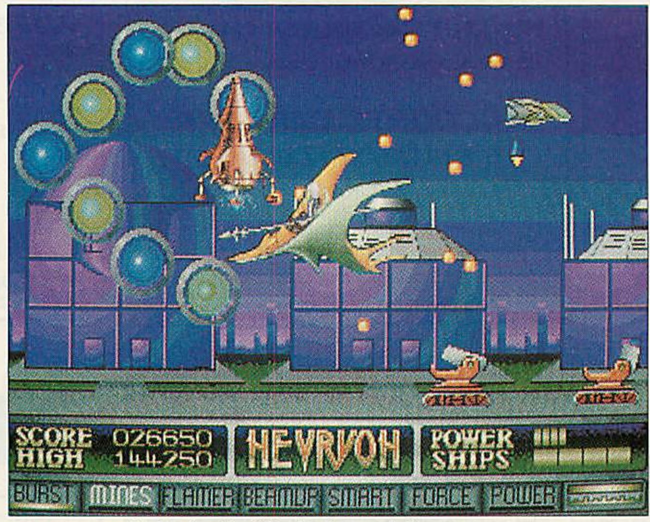
But wait, I use an Archimedes, I bring my work home to do in the evenings and even sometimes take my system apart and transport it it to work. Then after my day in the office, take it apart again and take it home! Hang on a minute, what am I doing? Why don't I just get rid of my Archimedes, get a Mac for home and buy one of those marvellous Powerbooks and be able to have computing on the move?

Since I purchased my Archimedes, when the system was first introduced onto the market, I have had nothing but praise for it. In fact what I have found is that I am spending most of my conversations with computer dealers and *Windows* freaks carrying out Acorn's PR for them!

Where are all the Archimedes advertisements? Why do PC enthusiasts not even know about the Archimedes? Where is the Archimedes notebook computer? Where is 24-bit colour?

Acorn are playing the selling game in a strange manner. You only get sales and profits up by having a good product, which they have. However it also has to be marketed correctly. I feel that relying solely on the education market and not attacking the business market, Acorn have missed a golden chance. No adverts in the IBM PC magazines, no business-related products like a notebook. Am I stuck with just a home computer with a limited future?

Most of these comments have been made before by other people but where is Acorn? Companies like Computer Concepts, and magazines like *BBC Acorn User* have actually done the job of selling the Acorn Archimedes.



Nevryon, are the big bad baddies bad enough for you?

So what do I do? Do I battle on with my Archimedes while the rest of the world accelerates with Notebooks, 24-bit colour, Windows 3.1 (which is bad, but PC owners know no different, do they Acorn?) Or do I get rid of my Archimedes and buy a Mac Powerbook and take a step into the real world? Do I have a choice, Acorn?

Ian Kingston
Crewkerne
Somerset

All sources from Acorn point to the portable launch being not far away. Sam Wauchope, Managing Director of Acorn Computers Ltd said to *BBC Acorn User* last month that the laptop would 'be seen publicly within the next two or three months'.

And recently at the Which Computer Show, Acorn took a step away from education. Their stand was devoted entirely to Acorn DTP solutions, with Computer Concepts and EFF showing their products on the Acorn desktop publishing system.

MOVE THOSE SPRITES

I own a BBC A3000 and have at home a couple of shoot-em-up games.

I wish to make out a point for future shoot-em-up games authors. Most of the games produced are *R-Type* clones, but why is it not possible to make a real *R-Type* game? If it were possible, I would urge Krisalis to convert one for the Archimedes, especially if it was *R-Type 2*.

What I really mean is that most games do not contain the real arcade flavouring. For example, when one meets a gruesome alien which guards a door to the next battle zone why does it seem that it is rusted and only able to shoot from one point?

In *R-Type 2* the aliens are dangerously tricky, being able to move and have multiple firing systems. Also they have some kind of intelligence as they are able to corner you and blast the living daylights out of your ship. So come on, you games programmers, get some real movement into those monsters.

Daniel Zerafa
Ghajn Sielem
Gozo

Watch out for *Scorpius*, coming soon from Arxe Systems. From the way the rumours are buzzing it sounds like quite some shoot-em up.

VARIABLE VOLUME

Is it possible to make the sound on a BBC any louder than it is with the -15 setting in the SOUND command, and does it involve soldering?

Richard Keeble
Epsom
Surrey

If your BBC Model B is not loud enough already, then it probably means that the internal volume isn't set to full power.

If you take the top off your Model B and trace the wires from the speaker to their source, just left of the socket is a small variable resistor marked VR1. While holding down CTRL-G use a small screwdriver to turn this clockwise until the desired volume level is reached. If this still isn't loud enough then you can always run the wires out of the machine and connect them to a small amplifier.

You can also pick up some early Beebs and Electrons on AM radio with a bit of fiddling with the tuning knob, so your Beeb might be able to produce sound at some wattage from a standard home Hi-Fi without opening the case.

FILECORE FIX

I was reading the Questions and Answers section, *BAU* April '92, and M. Dunkin of Lincoln wrote in asking for a remedy for the dreaded 'Filecore in Use' error. He was told to dismount discs. This does work, although it will not when you are actually given the error on screen.

Also he said that he is using a lot of discs at once, so dismounting them will not stop him from needing them.

There is a more effective way of killing the error when you are actually given it, and you will not need to dismount your discs. When you get the error do the following:

First of all Press F12. this may give you the error 'ShellCLI Task Still Active'. If so then you will have to type the following commands into the New Task box, accessible from the Task Manager Icon.

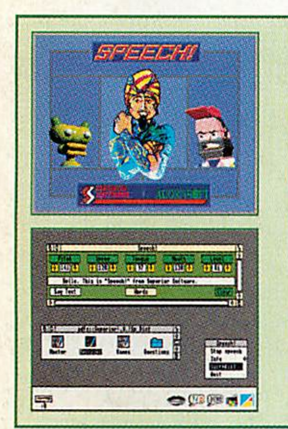
Type the command RMKill Filecore%adfs and press RETURN. Then type RMReinit adfs and press RETURN twice.

You will now be able to use the filing system again.

Miles Carter
Chandlers Ford
Hampshire

Although this temporarily stops the error it is not recommend as a permanent cure, merely a temporary fix. As pointed out in *INFO some months ago the RMKill and RMReinit commands are best used so that you can save all of your work and then reset your machine.

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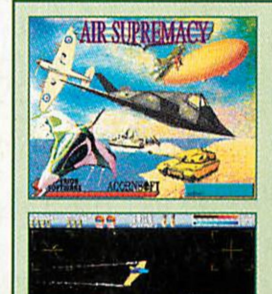


SPEECH!

Give your computer a voice with this high quality speech synthesiser, which is both easy to use and very flexible. It can directly speak words you input or text files, or you can use phonetic input to add stress/intonation, speak foreign languages or even sing! An easily modified spelling program is included.

"For just 20 quid, Superior is offering a bargain here" ...Computer Shopper (Aug. 91)
"The most sophisticated of the speech programs" ...Special Solutions News - Acorn Computers (Autumn 91)
"Unquestionably the best buy" ...Micro User (July 91)

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AIR SUPREMACY

In this unique game, you can swap between air and ground/sea forces as the battle develops. Practise with the biplanes and tanks of 1918 Europe, the fighters and gunboats of the Pacific 1944, and the guided missile jets and desert tanks of the Gulf 1991. Then to 2150 and the final challenge!

"The sense of speed when flying around is excellent. Skimming along the ground in a stealth fighter is particularly fun" ...BBC Acorn User (Dec. 91)
"The ultimate dogfighting game - will take weeks of intensive play to complete - sinks its hooks into you and doesn't let go" ...Archimedes World (Dec. 91)

£24.95

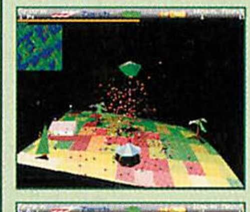


SUPERIOR GOLF
plus CONSTRUCTION SET

The complete golfing game for 1 to 4 players, designed exclusively for the ARCHIMEDES. Realistic gameplay with a choice of six courses (St Andrews, The Belfry, Victoria and three Sea Palms courses), plus Driving Range and Practice Green. Full feature hole and course design and editing facilities.

"Technically brilliant, graphically excellent and incredibly playable. Worth going a fairway to buy" ...A & B Computing (now Archimedes World) (Dec. 90)

£19.95

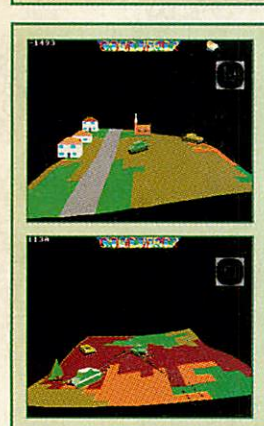



ZARCH

David Braben, co-author of ELITE, has harnessed the speed and performance of the ARCHIMEDES to create a programming masterpiece. Nerve-tingling gameplay over a massive 3-dimensional landscape, with realistic area shading and accurate perspectives. Totally addictive.

"LANDER - which is supplied with the Acorn equipment - is fun; ZARCH is a game. ZARCH has a map, it has a string of bad guys and most importantly of all it has a series of challenges that develop as you play the game. And that's what gives it the quality possessed by the greatest games" ...BBC Acorn User (Nov. 91)

£19.95



CONQUEROR

Step into a tank of your choice and experience the thrill of controlling one of the most powerful land vehicles in the world, in a 3-dimensional landscape of roads, hills, villages, rivers and woodland. Choose the Arcade or Attrition games to develop your skills, and then ultimately the Strategy game, a full battle simulation with up to 16 tanks per side from American, German or Russian forces.

"What I want is a thinking man's shoot-em-up and CONQUEROR fits that bill" ...Micro User (May 88)
"A highly addictive tank simulator" ...Learning Curve Magazine (Aug. 90)

£24.95

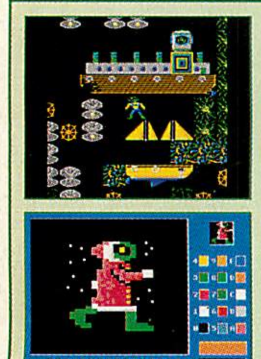



HOSTAGES

The highly acclaimed, top-hit ATARI/AMIGA game, now reaches the ARCHIMEDES. Commando action and strategic planning as you rescue the hostages from the besieged embassy. Brilliant, realistic graphics and exciting gameplay...superb digitised sound effects and tunes...keyboard or mouse control.

"Graphically the game is very nice indeed. Your men run around, jump, leap, roll and die with great aplomb and the animation of them is excellent" ...A & B Computing (now Archimedes World) (Dec. 90)

£19.95

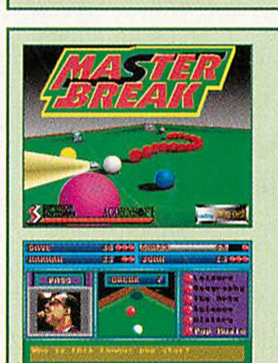


REPTON 3

Four of the most popular strategy games ever produced for Acorn computers in one great value-for-money package. Four complete Repton games - REPTON 3, AROUND THE WORLD IN 40 SCREENS, THE LIFE OF REPTON and REPTON THRU TIME - with choice of four tunes and a position Save/Recall facility, plus easy-to-use screen and character design and editing facilities.

"REPTON 3 is an on-screen strategy program which children from seven upwards simply adore. No library of games software is complete without REPTON 3 - it is a must" ...BBC Acorn User (Nov. 91)

£19.95



MASTER BREAK

A snooker-style trivia quiz for 1 to 4 players. Over 2000 questions on SCIENCE & NATURE, POP MUSIC, GEOGRAPHY, SPORTS & PASTIMES, ARTS and HISTORY. Digitised pictures include: sport and pop stars, famous places, animals and world leaders. Amusing and educational. Can you get the maximum break of 147?

"The digitised pictures and sounds are very nice indeed. The timer really adds atmosphere - I panicked the first time I tried to answer a black question...it's good to play on your own or with friends" ...Micro User (Mar. 91)

£19.95

SPEECH!, HOSTAGES, MASTER BREAK and the REPTON games are also available for the BBC MICRO/MASTER and ELECTRON computers. Please write to the address below or telephone for a full list of our BBC MICRO/MASTER (including MASTER COMPACT) and ELECTRON titles.



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